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SHIPPING AND HANDLING INSTRUCTIONS

This Service Manual describes, in detail, the Invacare 3, 5 and 6 Oxygen Concentrators. It has been carefully written to explain concentrator operation, service and preventative maintenance. Before you install and operate the concentrator, please refer to OWNER'S MANUAL.

The Invacare concentrator should always be kept in the upright position to prevent cabinet damage while being transported. The shipping container has been designed to assure maximum protection of the concentrator.

If the concentrator is to be reshipped by common carrier, it should be packed in a new carton. Additional cartons are available from Invacare.

The air compressor suspension system has been engineered to withstand severe motion and orientation.

UNPACKING (FIGURE 1)

1. Check for any obvious damage to the carton or its contents. If damage is evident, notify the carrier, or Invacare.
2. Remove all loose packing from the carton.
3. Carefully remove all the components from the carton.

NOTE: After inspection, unless the Invacare Oxygen Concentrator is to be used immediately, retain carton and packing materials for use in storing until use of the concentrator is required.

INSPECTION

1. Examine exterior of the Invacare Oxygen Concentrator for nicks, dents, scratches or other damages. Inspect all components.

STORAGE

1. Store the repackaged Invacare Oxygen Concentrator in a dry area.
2. **DO NOT** place other objects on top of the repackaged concentrator.

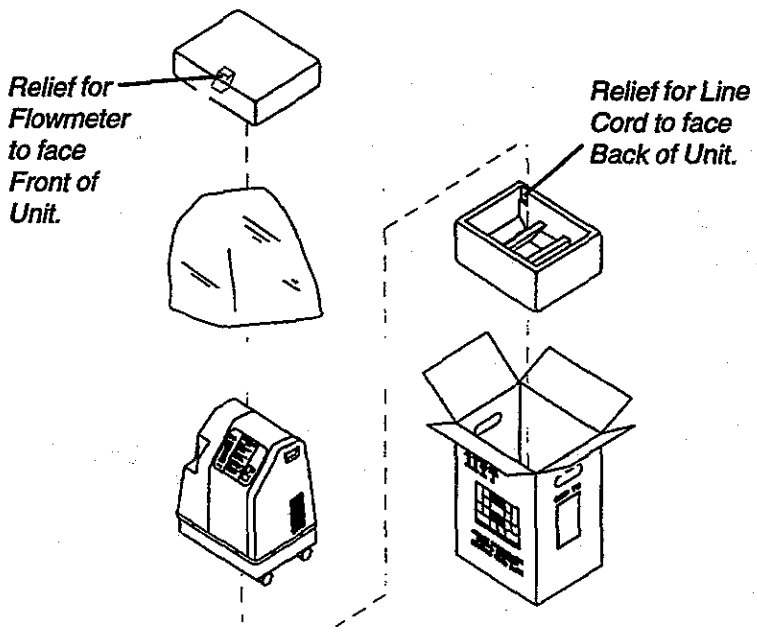

FIGURE 1 - UNPACKING

POWER CONSUMPTION FORMULA

If a customer inquires as to the amount of electricity needed to run a concentrator and / or their monthly operating costs, here's the formula :

		IRC301 Example
Wattage Rating of Concentrator	_____ Watts	350
Hours per Day of Usage	x_____ Hours	12
Number of Days in Month	x_____ Days	30
Divide by 1000	÷ 1000	
Equals : Kilowatt Hours (KWH)	=_____ KWH	126
To Calculate Monthly Operating Cost: Obtain the KWH Rate from your electric bill and Multiply :	x_____ $ / KWH	$.08
Equals: Monthly Operating Cost	= $_____	$ 10.08

INVACARE®

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☐ Home O2 Systems

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In an effort to continually improve the quality of this seminar, we would like you to rate us and provide us with your comments and suggestions regarding this course.

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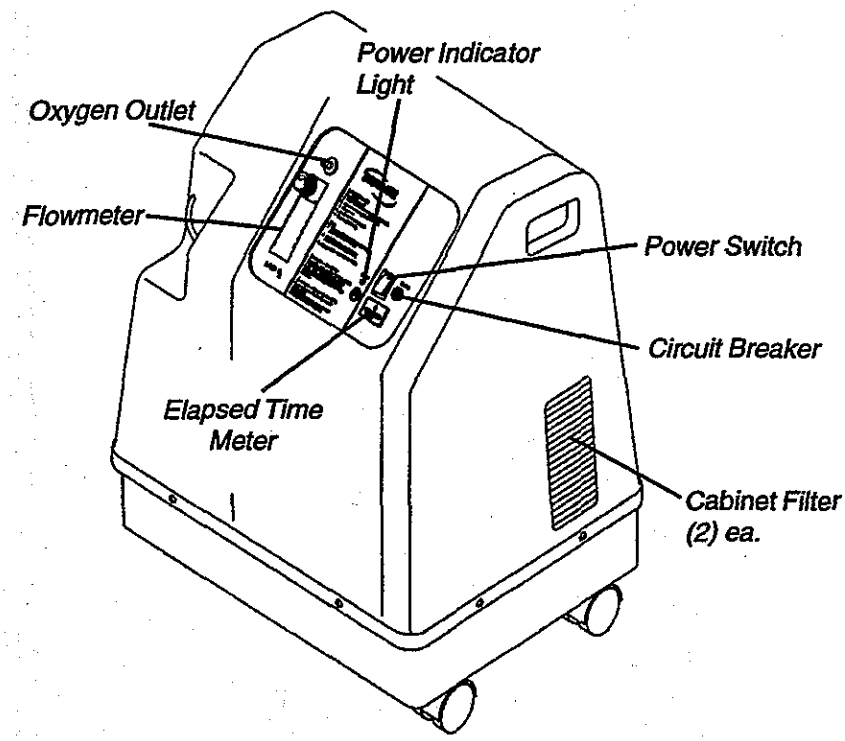
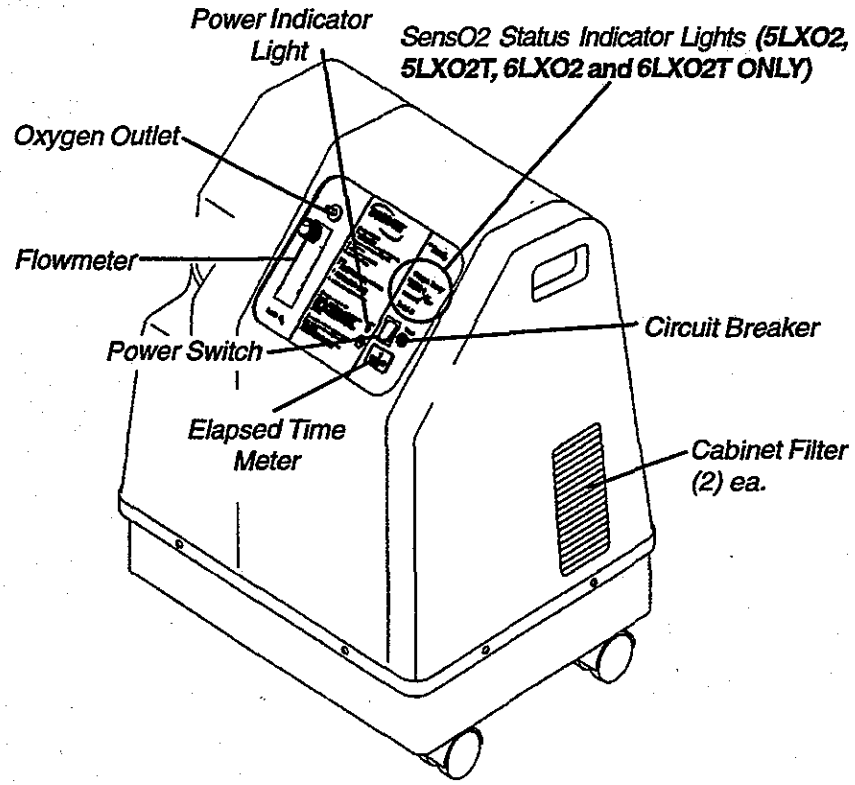


FEATURES - 3LX, 5LX



FEATURES - 5LXO2, 5LXO2T, 6LXO2, 6LXO2T

SPECIFICATIONS, CONTINUED

Filters:	Cabinet Compressor Inlet In-Line Exhaust Bacteria
Safety Systems:	Current overload or line surge shutdown. High temperature compressor shutdown. High pressure alarm w/compressor shutdown. Low pressure alarm w/compressor shutdown. Battery Free™ Power Loss Alarm Flow Sentry™ Flow Monitor SensO2 Oxygen Monitoring System (IRC301O2 / IRC501O2)
Width: **Height:** **Depth:**	18-inches (45.7 cm) 23.75-inches (60.3 cm) 14-inches (35.6 cm)
Weight:	54 lbs. (24.5 kg) **(IRC501/IRC501O2)** 51 lbs. (23.2 kg) **(IRC301/IRC301O2)**
Shipping Weight:	64 lbs. (29.1 kg) **(IRC501/IRC501O2)** 61 lbs. (27.7 kg) **(IRC301/IRC301O2)**
Operating Temperature **Exhaust:** **Oxygen Outlet:**	 Less than Ambient + 35°F (+16°C) Less than Ambient + 4°F (+2°C)
Cabinet:	Impact resistant flame-retardant plastic cabinet.
Regulatory Listing:	ETL certified complying with UL 544 and UL 1431
Recommended End-User Guidelines for Optimum Performance:	
Temperature:	32° - 95°F (0° - 35°C)
Electrical:	No extension cords
Placement:	No closer than 3-inches from wall
Tubing:	50 ft. maximum (do NOT pinch)
Room Characteristics:	Smoke and soot-free No confined spaces (closet)
Relative Humidity:	20 to 90%
Time of Operation:	Not less than 30 minutes at a time Up to 24 hours per day
Flow Rate:	From 5 l/min. or 3 l/min. to 1/2 l/min. For flows less than 1/2 l/min., use Mobilaire Pediatric Flowmeter.

SPECIFICATIONS

STANDARD SPECIFICATIONS

Electrical Requirements:	120 VAC, 60 Hz
Rated Current Input:	5.0 A (IRC501 / IRC501O2) 3.5 A (IRC301 / IRC301O2)
Sound Level:	52 dB Average (IRC301 / IRC301O2) 53 dB Average (IRC501 / IRC501O2)
Operating Altitude:	Up to 6,000 ft. (1828 meters) above sea level without degradation of performance. From 6,000 ft. (1828 meters) to 13,129 ft. (4000 meters) below 90% efficiency.
Ambient Temperature Range:	32°F - 95°F (0° - 35°C)
Oxygen Output:	1/2 to 5 l/min., 5 psi ± 0.5 psi (34.5 kPa ± 3.45 kPa) (IRC501 / IRC501O2) 1/2 to 3 l/min., 5 psi ± 0.5 psi (34.5 kPa ± 3.45 kPa) (IRC301 / IRC301O2)

Concentration Levels:

IRC501 / IRC501O2	IRC301 / IRC301O2
95% ± 2% at 1 l/min.	95% ± 2% at 1-2 l/min.
95% ± 2% at 2 l/min.	92% ± 3% at 3 l/min.
95% ± 2% at 3 l/min.	
94% ± 3% at 4 l/min.	
91% ± 4% at 5 l/min.	

Alarm Thresholds:
(IRC301O2 / IRC501O2)

	Indicators	
O_2 Purity	Internal Switch Set at 73%	Internal Switch Set at 85%
Over 85% (±2%)	Green	Green
73% (±3%) to 85% (±2%)	Yellow	Red Continuous Audible Alarm Sieve-GARD™ Compressor Shut-Down
Below 73% (±3%)	Red Continuous Audible Alarm Sieve-GARD™ Compressor Shut-Down	

Flow, adjustable in 0.5 liter increments:	1/2 - 5 l/min. (IRC501 / IRC501O2) 1/2 - 3 l/min. (IRC301 / IRC301O2)
Power Consumption:	450W (IRC501 / IRC501O2) 350W (IRC301 / IRC301O2)
Pressure Relief Mechanism operates at:	35 psi ± 3.5 psi (241 kPa ± 24.1 kPa)

SPECIFICATIONS

STANDARD SPECIFICATIONS	
Electrical Requirements:	120 VAC ±10% (132 VAC/108 VAC), 60 Hz
Rated Current Input:	3.6 A **(3LX)** 3.4 A **(5LX, 5LXO2, 5LXO2T, 6LXO2, 6LXO2T)**
Sound Level:	52 dB Average **(3LX)** 53 dB Average **(5LX, 5LXO2, 5LXO2T, 6LXO2, 6LXO2T)**
Operating Altitude:	Up to 6,000 ft. (1828 meters) above sea level without degradation of performance. From 6,000 ft. (1828 meters) to 13,129 ft. (4000 meters) below 90% efficiency.
Ambient Temperature Range:	50°F - 95°F (10° - 35°C)
***Oxygen Output Concentration Levels:**	**(5LX, 5LXO2, 5LXO2T, 6LXO2, 6LXO2T)** 95.6% to 93% at 1-3 L/min. 95.6% to 91% at 4 L/min. 95.6% to 87% at 5 L/min. 95.6% to 87% at 6 L/min.**(6LXO2, 6LXO2T)** **(3LX)** 95.6% to 93% at 1-2 L/min. 95.6% to 87% at 3 L/min. *** Stated performance maximum achieved after 30 min. of run time.**
Maximum Outlet Pressure:	**(5LX, 5LXO2, 5LXO2T, 6LXO2, 6LXO2T)** 5 psi ± 0.5 psi. (34.5 kPa ± 3.45 kPa.) **(3LX)** 5 psi ± 0.5 psi. (34.5 kPa ± 3.45 kPa.)
***Sens*O2 Alarm Thresholds:**	**Indicators**

If no internal selector switch, 73% operation ONLY.	O2 Purity	Internal Switch *Set at 73%	Internal Switch Set at 85%
	Over 85% (± 2%)	**GREEN** Indicator Light	**GREEN** Indicator Light
	73% (± 3%) to 85% (±2%)	**YELLOW** Indicator Light	**RED** Indicator Light - Continuous Audible Alarm Sieve GARD™ Compressor Shutdown
	Below 73% (± 3%)	**RED** Indicator Light - Continuous Audible Alarm Sieve GARD™ Compressor Shutdown	**N/A**

	* Factory Preset at 73%
Flow Range:	1/2 - 5 L/min. **(5LX, 5LXO2, 5LXO2T, 6LXO2, 6LXO2T)** 1/2 - 3 L/min. **3LX)** For flow rates less than 1/2 L/min., use the Invacare Pediatric Flowmeter PF16.
Power Consumption:	460W **(6LXO2, 6LXO2T)** 350W/400W **(3LX)** 400W **(5LX, 5LXO2, 5LXO2T)**
Pressure Relief Mechanism Operational at:	35 psi ± 3.5 psi (241 kPa ± 24.1 kPa)

SPECIFICATIONS, CONTINUED

Filters:	Cabinet Compressor Inlet Bacteria
Safety Systems:	Current overload or line surge shutdown. High temperature compressor shutdown. High pressure alarm w/compressor shutdown. Low pressure alarm w/compressor shutdown. Battery Free™ Power Loss Alarm. *Sens*O2 Oxygen System **(5LXO2, 5LXO2T, 6LXO2, 6LXO2T ONLY).**
Width: **Height:** **Depth:**	18-inches (45.7 cm) 23.75-inches (60.3 cm) 14-inches (35.6 cm)
Weight: **Shipping Weight:**	54 lbs. (24.5 kg) **(All 5LX and 6LX Models)** 53 lbs. (23.9 kg.) **(3LX)** 59 lbs. (27 kg) **(All 5LX and 6LX Models)** 58 lbs. (26.1 kg.) **(3LX)**
Operating Temperature **Exhaust:** **Oxygen Output:**	 Less than Ambient + 35° F (+16° C) Less than Ambient + 4° F (+2° C)
Cabinet:	Impact Resistant flame-retardant plastic cabinet.
Regulatory Listing:	ETL certified complying with applicable portions of UL 1431
RECOMMENDED END-USER GUIDELINES FOR OPTIMUM PERFORMANCE:	
Temperature:	50° - 95°F (10° - 35°C)
Electrical:	No extension cords.
Placement:	No closer than 3-inches from any wall.
Tubing:	Crush-Proof Tubing - 50 feet (15.2 m.) maximum **(do NOT pinch).**
Room Characteristics:	Smoke and soot-free No confined spaces (closet).
Relative Humidity:	20 to 60%
Time of Operation:	Up to 24 hours per day.

INSTALLATION AND SEQUENCE OF OPERATION

Model IRC301O2 / IRC501O2 – Serial Numbers 93D to Present
Model IRC301 – Serial Numbers 90E to Present
Model IRC501 – Serial Numbers 90F to Present

INSTALLATION

When your new Mobilaire concentrator arrives, it should be checked for proper operating conditions.

1. If the unit has been in below-freezing temperatures, allow it to warm up for 30 minutes at room temperature before operating.
2. The IRC301/501 will need to be turned on for a few seconds to charge the Battery Free™ Alarm Circuit. Connect power cord to receptacle and turn on concentrator. Turn flow control knob counterclockwise and flow will begin immediately. Set flow of the Mobilaire III to 3 l/min. and Mobilaire V to 5 l/min. Turn unit off.
3. With the power cord unplugged, press On/Off switch to the "on" position. An audible alarm will sound. This checks the Battery Free™ Alarm Circuit. Turn switch "off."
4. Connect cord to receptacle and turn on concentrator. 3 BEEPS on startup. Check the oxygen concentration per specifications after 30-40 minutes running time.

SEQUENCE OF OPERATION

Apply 120 VAC via the power switch energizes the compressor motor, hour meter, cooling fan and the printed circuit (P.C.) board.

Room air enters the compressor via the cabinet filter, air inlet filter, and sound muffler. The air is compressed by the wobble pistons in the compressor to a pressure of 20 PSI (137.72 kPa), then put through an in-line filter. *Units built prior to 90K will run at 22 PSI (151.5 kPa).

As increased pressure creates increased temperature, a heat exchanger is utilized to lower the temperature by 20° F (-6.7° C) as the air enters the four-way solenoid valve. It is then channeled to a sieve bed containing the adsorption material. A restrictor downstream of the sieve bed causes pressure to build up inside the sieve bed which is necessary for the adsorption process. A small amount of relatively pure oxygen enters a storage tank with the balance entering the top of the second bed. The nitrogen removed is purged from the bed through the four-way valve into room air. A filter is located at the exhaust end of the valve to muffle the nitrogen exhaust as it enters the air.

The oxygen not being used to purge is channeled into a storage tank. The pressurized oxygen is regulated down to 5 PSI (34.4 kPa), enters an accurate flow-measuring device, flows through a bacterial filter and out to the patient.

The electrical energization of the solenoid valve is accomplished every 10 to 14 seconds by the pressure sensor and P.C. board electronics when the pressure set point of 20 PSIG ± .3 (137.72 kPa ± 51.32 kPa) is reached. The time between cycles is dependent on altitude and flow rate. A spring in the valve allows it to return to its original position when de-energized.

On the IRC501 / 501O2, a 2-way pressure equalization valve opens just prior to the shift of the 4-way valve. This allows high purity oxygen to enter the same bed from the top. This additional pressure allows the bed to start its cycle at a higher pressure. The 2-way valve will close just after the shift of the 4-way valve.

INSTALLATION AND SEQUENCE OF OPERATION, CONTINUED

If power is interrupted, the Battery Free™ alarm will sound a short "beep," with a long pause, intermittently. All IRC301's and IRC501's are equipped with a diagnostic alarm system that signals if the system's pressure or electrical system malfunctions. The Troubleshooting Guide explains the alarm system's signals and reasons in detail for your convenience.

SensO_2 OXGYEN SENSOR TECHNOLOGY CERAMIC ZIRCONIA SENSOR

Technical Description

The oxygen being produced by the concentrator flows out of the product tank and into the flowmeter. In-line between these components is a tee fitting that directs a small flow of oxygen through a precision orifice to the oxygen sensor mounted on the printed circuit board.

As the oxygen enters the sensor housing, it passes through a screen and contacts the electrode mounted on the top of the zirconia disk.

Electric current flowing to the top electrode and through the zirconia disk to the bottom electrode heats the disk to over 300° C. Oxygen molecules on top of the disk pick-up extra electrons and become oxygen ions. These oxygen ions are attracted to the electrode on the bottom of the zirconia disk. Because of the crystal structure of the zirconia, only oxygen ions can pass through. Once oxygen ions reach the bottom electrode, the extra electrons are released from the oxygen ions and oxygen molecules return to the air. The number of electrons is directly related to the oxygen concentration. The electrons travel to the PC board where they are "counted" and the oxygen concentration "reading" is calculated.

A micro-processor on the PC board contains software that interprets the signal being received from the sensor. It compares the signal to clinical acceptable limits that have been selected with the indicator switch mounted on the PC board. Signals outside of the clinical acceptable limits generate responses in the form of lighted LED's, audible indicators, and/or system shut-down.

Operating Sequence

Once the power switch has been turned to ON, the *Sens*O2 circuit will wait 5 minutes for the concentrator to begin to produce clinical acceptable oxygen before activating. No LED's will illuminate for at least 5 minutes.

After 5 minutes, when oxygen purity exceeds 85% ± 2% the green LED will illuminate.

If the oxygen level is not above 85% ± 2% after the first 5 minutes, LED's will remain off. The system will wait for a maximum of 30 minutes from start-up to reach 85% ± 2% before activating an alarm. Environmental factors, such as low voltage, high altitude, or age of the machine will affect the time required to reach 85% ± 2%.

If the oxygen level is not above 85% ± 2% within the first 30 minutes, the oxygen level alarm sequence will activate, depending upon the position of the indicator switch. All units are preset at the factory at 73% ± 3%.

When oxygen concentration is above 85% ± 2%, the sensor measures oxygen purity every 10 minutes. If a reading falls below 85% ± 2% and the alarm indicator is in the 73% mode, the oxygen sensor measures purity continuously and a yellow LED will illuminate. If the oxygen purity falls below 73% ± 3% the red LED / Alarm / Shut-Down mode will activate. If the oxygen purity falls below 85% ± 2% with the indicator switch set at 85%, the red LED / Alarm / Shut-Down mode will activate.

INSTALLATION / SEQUENCE OF OPERATION

MODEL 3LX and MODELS 5LX,5LXO2, 5LXO2T, 6LXO2, 6LXO2T

INSTALLATION / VERIFICATION OF BATTERY FREE™ POWER LOSS ALARM

When your new Invacare concentrator arrives, it should be checked for proper operating conditions.

1. If the unit has been in below-freezing temperatures, allow it to warm up to room temperature **(approximately 30 minutes)** before operating.
2. The **concentrator** will need to be turned on for **4 to 5 seconds** to charge the Battery Free™ Power Loss Alarm. Connect power cord to outlet and turn the concentrator on. Turn flow control knob counterclockwise and flow will begin immediately. Set flow rate of the Invacare 3 to 3 L/min., Invacare 5 to 5 L/min. and the Invacare 6 to 6 L/min. Turn unit off.
3. Unplug the power cord and press On/Off switch to the **ON** position. An intermittent audible alarm will sound. This confirms proper operation of the Battery Free™ Power Loss Alarm. Turn On/Off switch **OFF**.
4. Connect cord to outlet and turn on concentrator. Unit will sound **3 BEEPS** on startup.
5. Check the oxygen concentration per specifications after 30-40 minutes running time.

SEQUENCE OF OPERATION

Applying 120 VAC via the power switch energizes the compressor motor, hour meter, cooling fan and the printed circuit (P.C.) board.

Room air enters the compressor via the cabinet filter, compressor inlet filter, and sound muffler. The air is compressed by the wobble pistons in the compressor to a pressure of 20 PSI (137.72 kPa) BEFORE Serial No. "97K" or 21 PSI (144.79 kPa) AFTER Serial No. "97K".

As increased pressure creates increased temperature, a heat exchanger is utilized to lower the temperature by 20° F (6.7° C) before the air enters the 4-way valve. It is then channeled to a sieve bed containing the adsorption material. A restrictor downstream of the sieve bed causes pressure to build up inside the sieve bed which is necessary for the adsorption process. A small amount of relatively pure oxygen enters the top of the second bed with the balance entering a storage tank. The nitrogen removed is exhausted back from the bed through the four-way valve into room air. A muffler is located at the exhaust end of the valve to muffle the sound of the exhaust as it exits the concentrator.

The oxygen not being used to exhaust is channeled into the storage tank. The pressurized oxygen is regulated down to 5 PSI (34.4 kPa), enters an accurate flow-measuring device, flows through a bacterial filter, a check valve and out to the patient.

The electrical activation of the 4-way valve is accomplished every 8 to 21 seconds by the pressure sensor and P.C. board electronics when the pressure set point of 20 ± 3 PSI (137.72 ± 51.32 kPa) BEFORE Serial No. "97K" or 21 ± 3 PSI (144.79 ± 51.32 kPa) AFTER Serial No. "97K" is reached. The time between cycles is dependent on altitude, flow rate and internal environmental factors.

On the **5LX/5LXO2/5LXO2T/6LXO2/6LXO2T**, a P.E. or Pressure Equalization valve opens just prior to the shift of the 4-way valve. This allows highly concentrated oxygen to enter the just exhausted bed from the top. This additional pressure allows the bed to start its cycle at a higher pressure. The P.E. valve will close just after the shift of the 4-way valve.

INSTALLATION / SEQUENCE OF OPERATION, CONTINUED

If main power is lost, the Battery Free™ Power Loss Alarm will sound a short **"beep"**, with a long pause, intermittently. All units are equipped with a diagnostic alarm system that signals if the pneumatic pressure or electrical systems malfunction. The Troubleshooting Guide explains the alarm system signals and reasons in detail for your convenience.

SENSO2 OXGYEN SENSOR TECHNOLOGY CERAMIC ZIRCONIA SENSOR

Technical Description

The oxygen being produced by the concentrator flows out of the product tank and into the flowmeter. In-line between these components is a tee fitting that directs a small flow of oxygen through a precision orifice to the oxygen sensor mounted on a printed circuit board.

As the oxygen enters the sensor, it passes through a screen and contacts the sensing disk.

Electric current flowing through a metal film resistor heats the disk in excess of 300°C. Oxygen molecules contact the electrode of the disk and pick-up extra electrons to become oxygen ions. These oxygen ions are attracted to the electrode on the bottom of the zirconia disk. Because of the crystal structure of the zirconia, only oxygen ions can pass through. When the oxygen ions reach the bottom electrode, the extra electrons are released from the oxygen ions and oxygen molecules return to the air. The number of electrons is directly related to the oxygen concentration. The electrons travel to the PC board where they are "counted" and the oxygen concentration "reading" is calculated.

A microprocessor on the P.C. board contains software that interprets the signal being received from the sensor. It compares the signal to clinically acceptable limits that have been selected with the indicator switch mounted on the PC board. Signals outside of the clinically acceptable limits generate responses in the form of lighted **LEDs**, audible indicators, and/or system shut-down.

Operating Sequence

Once the power switch has been turned **ON**, the $SensO_2$ circuit will wait 5 minutes for the concentrator to begin producing clinically acceptable oxygen before activating. No **LEDs** will illuminate for at least 5 minutes.

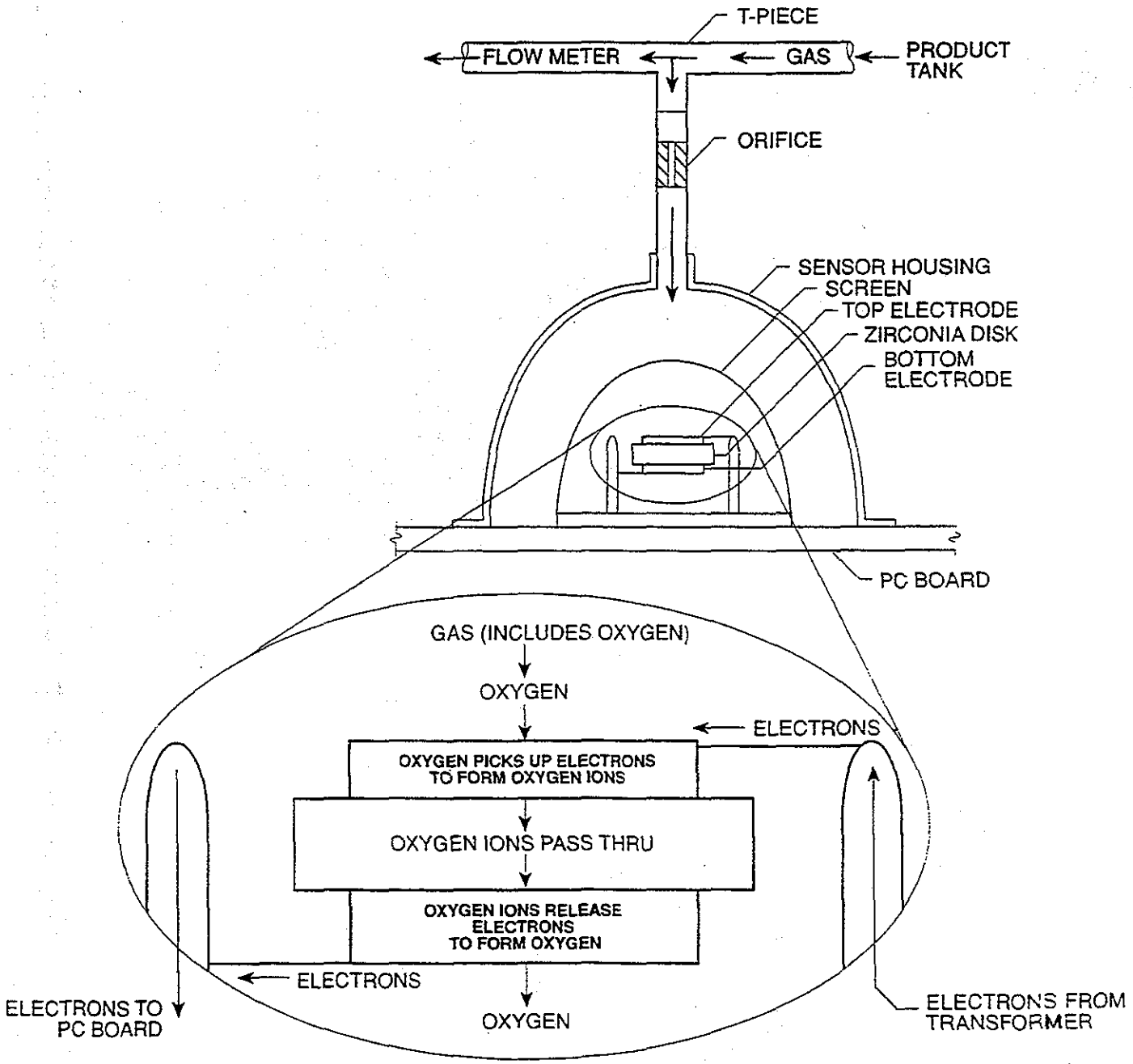
After 5 minutes, if the oxygen purity exceeds 85% ± 2% the **GREEN LED** will illuminate.

If the oxygen level is not above 85% ± 2% after the first 5 minutes, **LEDs** will remain off. The system will wait for a maximum of 30 minutes from start-up to reach 85% ± 2% before activating an alarm. Environmental factors such as low voltage, high altitude, or age of the machine will affect the time required to reach 85% ± 2%.

If the oxygen level is not above 85% ± 2% within the first 30 minutes, the oxygen concentration alarm sequence will activate, depending upon the position of the indicator switch. All units are preset at the factory at 73% ± 3%.

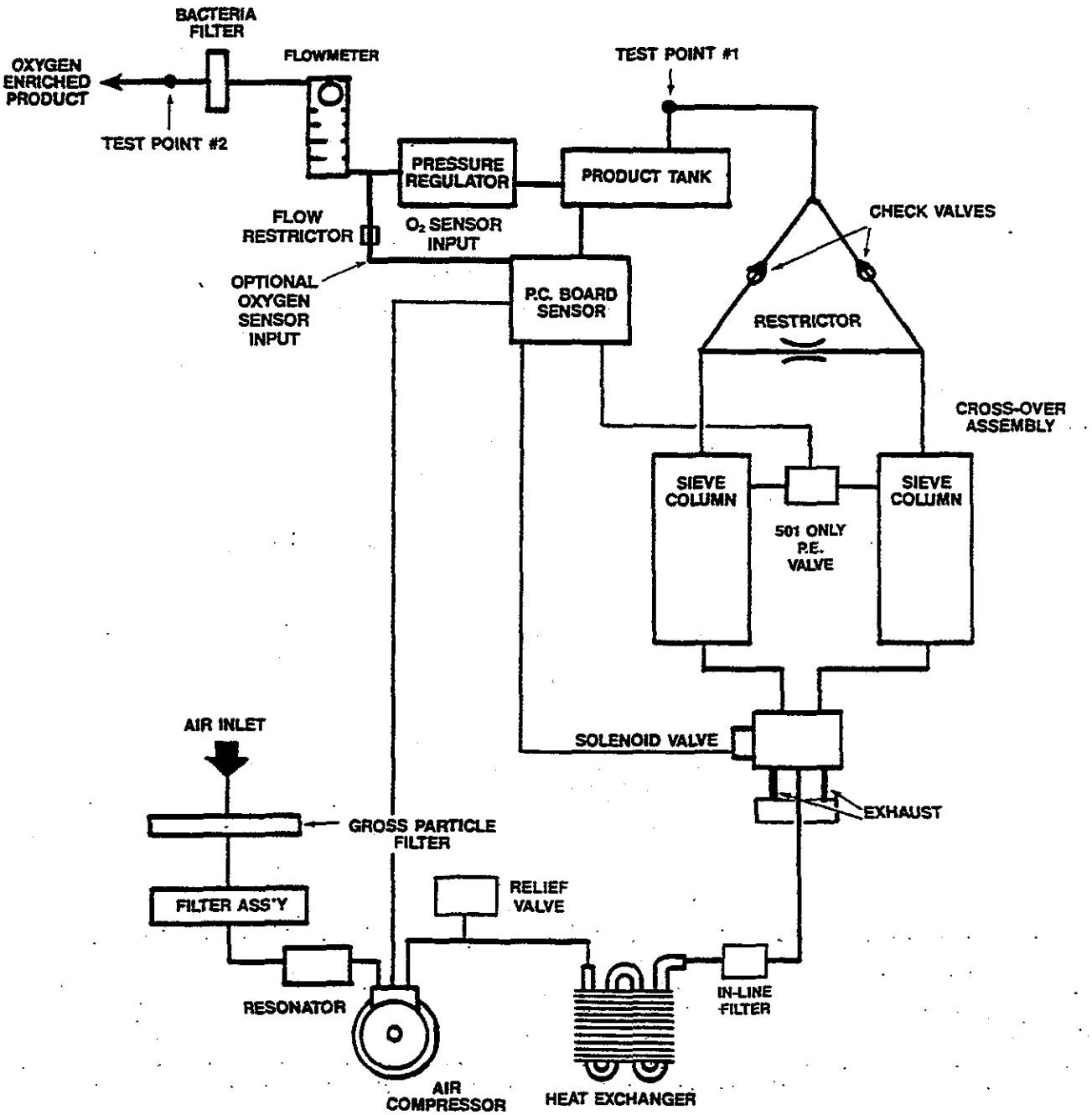
When oxygen concentration is above 85% ± 2%, the sensor measures oxygen purity every 10 minutes. If a reading falls below 85% ± 2% and the alarm indicator is in the 73% mode or no switch is present, the oxygen sensor measures purity continuously and a yellow **LED** will illuminate. If the oxygen purity falls below 73% ± 3% the **RED LED/Alarm/Shut-Down** mode will activate. If the selector switch is present and it is set at 85%, the **RED LED/Alarm/Shut-Down** mode will activate if the oxygen purity falls below 85% ± 2%.

SENSO$_2$ TECHNICAL ILLUSTRATION



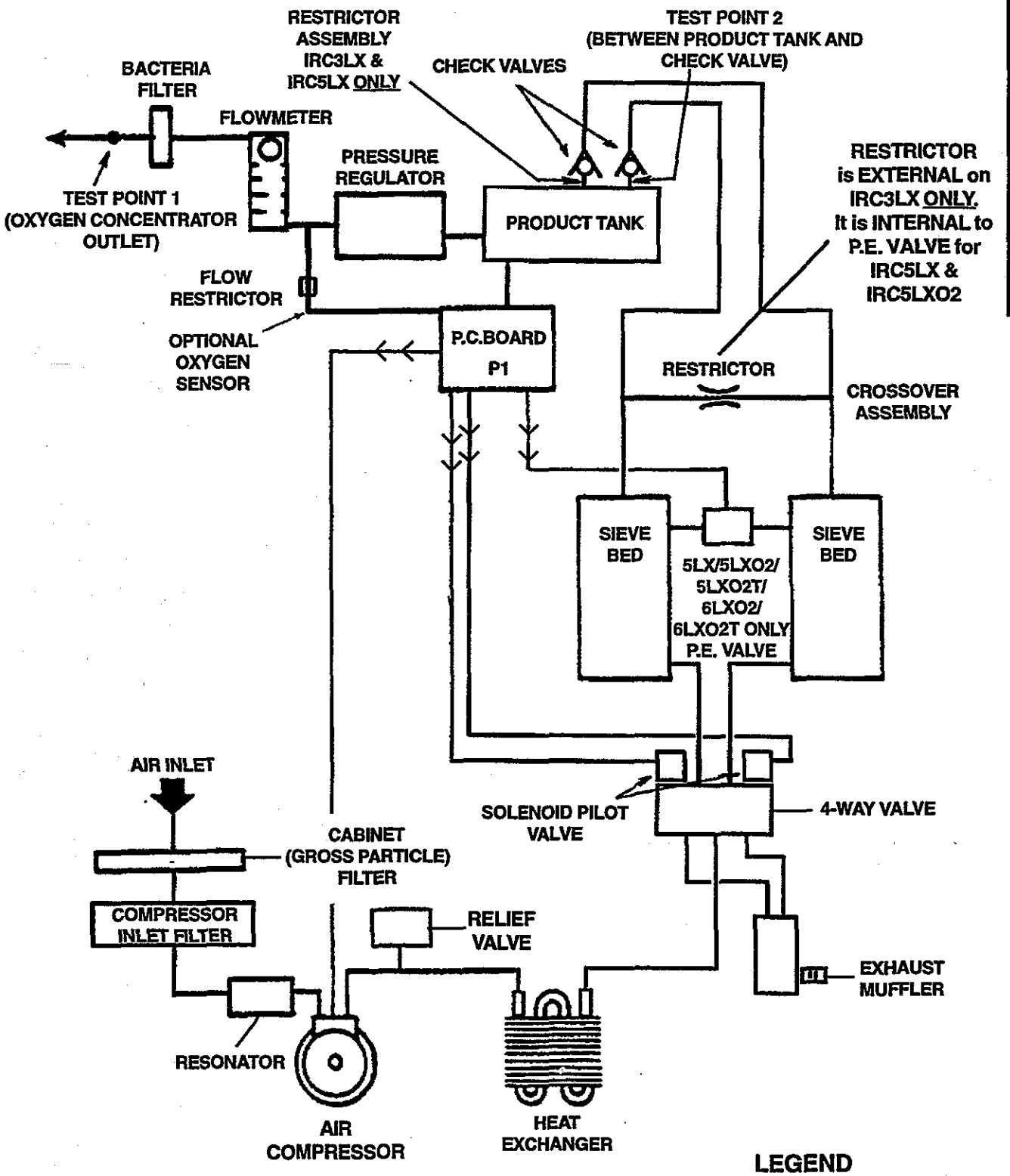
PNEUMATIC DIAGRAM

PNEUMATIC DIAGRAM



PNEUMATIC DIAGRAM

INVACARE 3 & 5 OXYGEN CONCENTRATORS
MODELS IRC3LX, IRC5LX, IRC5LXO2



INVACARE RESPIRATORY

OXYGEN CONCENTRATOR OPERATION

Invacare produces many models of Oxygen Concentrators.
Some of them are:

-IRC 301 3 Liter Machine
-IRC 501 5 Liter Machine
-IRC3LX 3 Liter Machine
-IRC5LX 5 Liter Machine
-IRC5LXO_2 5 Liter Machine with Sensor for O_2 output

In the following block diagram we show a typical oxygen concentrator and its components.

Item #1 **The Gross Particle Filter**
The gross particle filter (20 p.p.i.) is used to stop large particles of dirt (i.e. lint, animal fur, etc.) from entering the concentrator.

Item #2 **Intake Filter (Filter Assembly)**
This filter removes particles down to 1 micron in size. It is used primarily as a compressor filter.

Item # 3 **Resonators**
This device does nothing more than reduce noise from the intake of the compressor. (Muffler)

Item #4 **Air Compressor**
The function of the compressor is to compress filtered air to an average maximum **working pressure** of approximately 20 p.s.i. This compressed air is routed to the molecular sieve beds which require air under pressure to produce oxygen. Invacare uses Thomas brand oil-less piston compressors in most of the concentrator we manufacture.

Item #4A **Capacitor**
The capacitor is an electrical storage device used to help start the compressor motor.

Item #5 **Heat Exchanger**
The heat exchanger removes the heat produced by the compression and transfers it to the airstream supplied by the fan.

Item #6 **Inline Filter (IRC 301/ 501 Only)**
The inline filter is a .3 micron filtering device that is used to protect the Numatics Solenoid Valve.

Item #7 **Solenoid Valve**
A four-way valve manufactured by Numatics Inc. that directs compressed air to the sieve bed and directs the exhaust air out of the sieve beds.

Item #8 **Sieve Beds**
Spring loaded cannisters filled with molecular Sieve material. This material strips nitrogen from room air but allows oxygen to pass through the canisters.

Item #9 **P.E. Valve**
This item is only used on 5 liter machines. Its function is to pressurize the sieve bed with oxygen before the pressurizing cycle starts.

Item #10 **Restrictor**
An orifice with a hole diameter of .042". This component back-pressures the Sieve Cannister and thus determines the rate at which room air can flow through the Sieve Beds.

Item #11 **Check Valves**
Check Valves are one-way flow devices. They are used to insure that oxygen generated by the Sieve Beds goes to and stays in the product tank.

Item #12 **P.C. Board Sensor**
This device measures pressure in the product tank , and takes this information and uses it in the circuit to help decide when to shift the valves and if there are problems related to pressure, etc.

Item #13 **Product Tank**
A cannister of approximately 1-1/2 liters volume which stores oxygen for delivery to a patient. The larger the volume the more stable the flow valve out of the flowmeter.

Item #14 **Regulator**
The adjustable pressure regulator reduces input pressure to a constant 5 p.s.i. outlet pressure.

Item #15 **Flowmeter**

The flowmeter is a gas measuring device which controls the amount of oxygen dispensed to a patient.

Item #16 **Bacteria Filter**

This Filter consist of a .3 micron element. It is the final filter used in the patient oxygen stream.

PREVENTIVE MAINTENANCE RECORD
INVACARE OXYGEN CONCENTRATOR

MODEL NO. IRC_____ SERIAL NO. _____

EVERY 1-3 MONTHS																			
Date of Service																			
Record Elapsed Hours On Meter																			
Clean Cabinet Filter(s)																			
Check Oxygen Concentration **(UNITS WITHOUT *SENSO2*)**																			
Check Prescribed l/min. Flow Rate																			
Check Power Loss Alarm																			
ANNUALLY OR BETWEEN PATIENTS																			
Replace Bacteria Filter																			
ANNUALLY																			
Replace Cabinet Filter(s)																			
Clean Heat Exchanger																			
Check Oxygen Concentration **(*SENSO2* MODELS)**																			
AS REQUIRED																			
Replace Compressor Inlet Filter																			
Rebuild Top of Compressor																			
EVERY 20,000 HOURS																			
Replace Exhaust Muffler																			
Replace In-line Filter - **(ALL MODELS EXCEPT 3LX, 5LX, 5LXO2, 5LXO2T, 6LXO2, 6LXO2T)**																			

PROCEDURE 2

PREVENTIVE MAINTENANCE

REPAIR / REPLACEMENT GUIDE

INVACARE 3LX, INVACARE - 5LX/5LXO2/5LXO2T AND INVACARE - 6LXO2/6LXO2T

PROCEDURE 1 - REMOVING CABINET (FIGURE 1)

CAUTION

TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

1. Unplug unit.
2. Remove the eight (8) mounting screws that secure cabinet assembly to the base assembly.
3. Lift the cabinet straight up.

NOTE: When required, vacuum inside of the cabinet and exposed foam insulation.

4. To re-install cabinet, reverse **STEPS 2-3.**

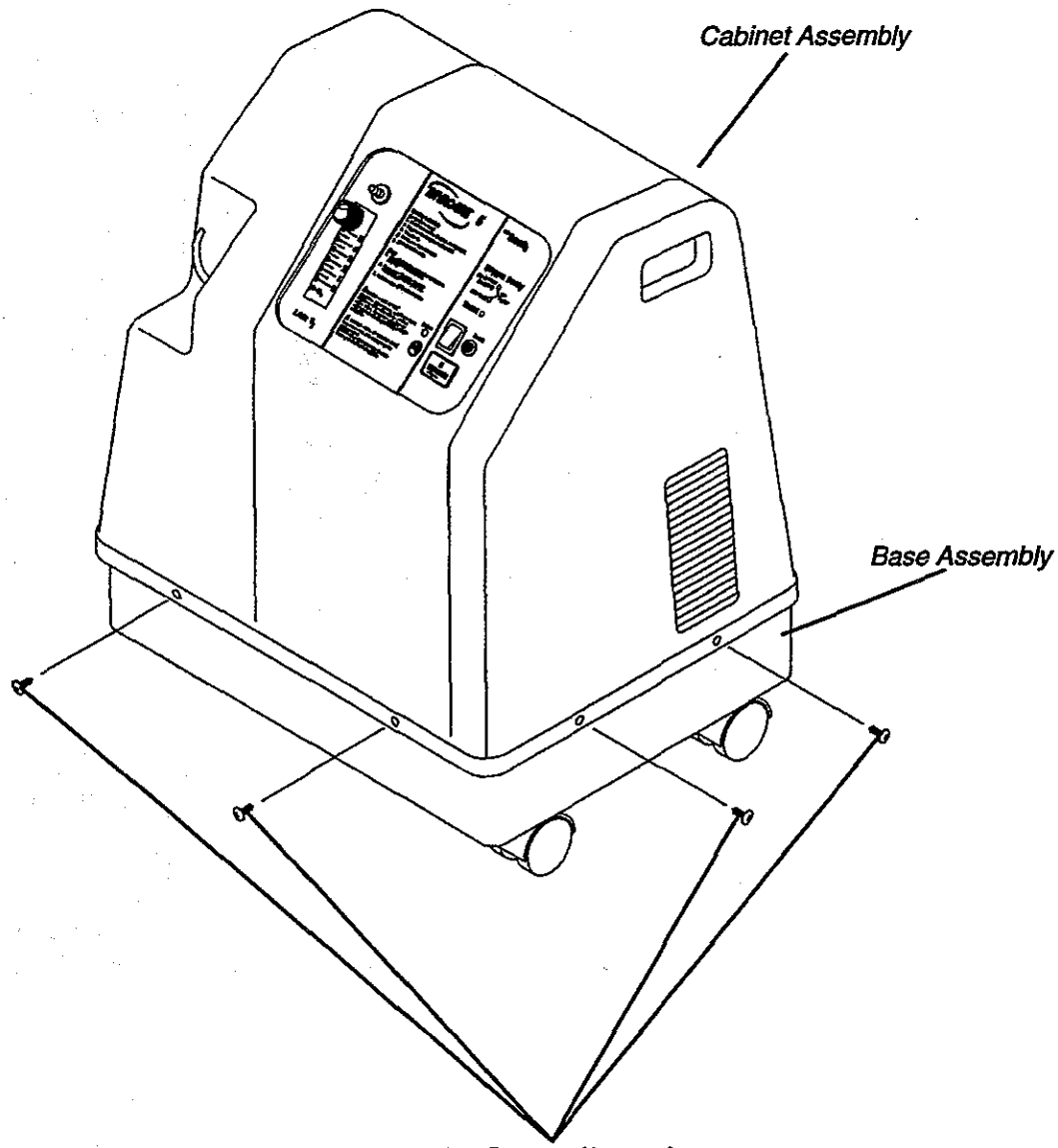
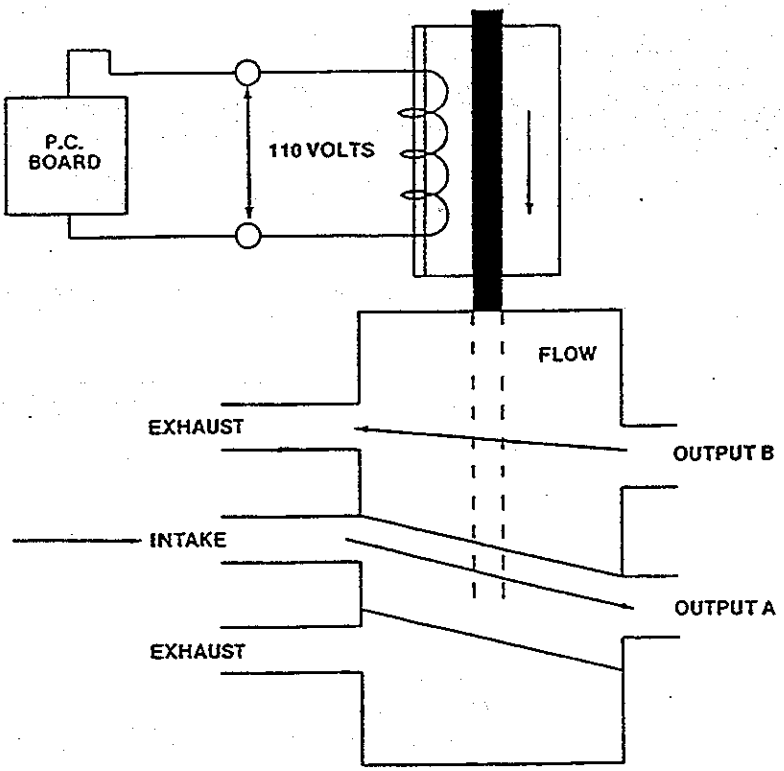


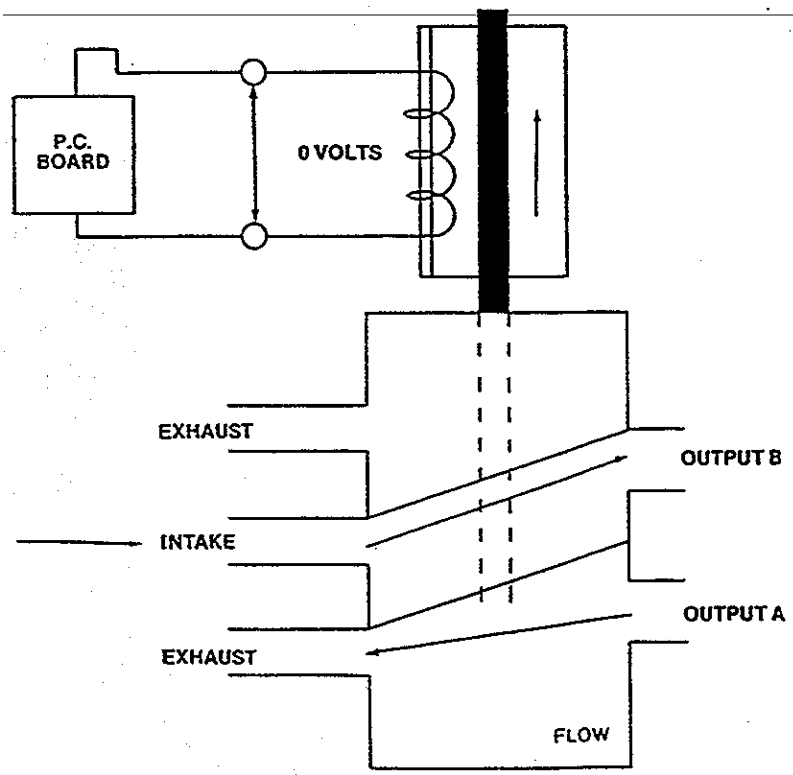
FIGURE 1 - REMOVING CABINET

FOUR-WAY VALVE

ENERGIZED



DE-ENERGIZED



INVACARE®
Innovation in Health Care™

SOLENOID/SPRING KIT KIT NO. 2001177

Installation and Assembly Instructions

Solenoid/Spring Kit and Servicing of the Solenoid Capsule.

UPGRADE KIT INCLUDES THE FOLLOWING:

1. One (1) PVC Hose 11-inches long.
2. One (1) Stainless Steel Spring to be used in conjunction with Item 1.
3. One (1) Coil.
4. One (1) End Cap.] = Solenoid Capsule
5. Two (2) Clamps.
6. Sleeve O-Rings (8)

NOTE: Six (6) O-Rings are needed - two (2) are spares.

The following instructions apply to Mobilaire III (IRC301) and Mobilaire V (IRC501 and IRC501C) upgrade.

REMOVING THE SPOOL/SLEEVE AND SOLENOID CAPSULE

WARNING

Turn *OFF* power and *UNPLUG* the cord from the Mobilaire Oxygen Concentrator.

1. Remove the 8 x 5/8-inch truss head screws that secure cabinet assembly to the base assembly.
2. Remove the four (4) screws that secure the control panel to the support frame.
3. Remove the clear tubing that is connected to the bottom of the flowmeter.
4. Move the control panel to the right-side of the concentrator.

NOTE: This will make access to the spool/sleeve and solenoid capsule easier.

5. Unscrew the inlet filter before disassembling the spool/sleeve and solenoid capsule.

SPOOL/SLEEVE GENERAL CLEANING INSTRUCTIONS (FIGURE 1)

NOTE: If unit is operating correctly, it is not necessary to clean the spool/sleeve assembly.

1. Remove the two (2) 6/32 x 3-inch flat head screws that secure the solenoid capsule (which include coil and end cap) to the spool/sleeve.
2. Remove the solenoid capsule and gasket.
3. Remove the two (2) screws (2.5 mm Allen) that secure the plate to the valve body and remove the plate.
4. Remove the two (2) screws from the endplate of the spool/sleeve assembly using a 3mm Allen wrench.
5. Remove endplate and spring.
6. Gently remove spool out of valve body.
7. Inspect spool for nicks, scratches or wear. If any of these are present, replace entire valve assembly or spool/sleeve assembly.

WARNING

The spool and sleeve assembly is a precision matched set. Spools are not interchangeable. It is recommended that only one (1) assembly be cleaned at a time or that special precautions be taken to prevent the accidental interchanging of spools.

8. Push the sleeve out of either end of the valve body until you can firmly grip the sleeve.

NOTE: A soft dowel (nylon, wood, etc.) slightly smaller than the outside diameter of the sleeve can be used with hammer (nylon, wood or rubber) to gently tap the sleeve partially out of the valve body.

9. Now twist the sleeve as you are removing it from the valve body.

NOTE: A twisting motion will reduce the possibility of damaging the O-rings on the sleeve when removing it from the valve body.

10. **To clean the spool assembly:**
    a. Apply Numatics® Valve Cleaner **(P/N 0137-135)** to the spool by rubbing the lands briskly with a soft clean cloth.
    b. Allow a few minutes for the cleaner to dry (will turn white) and then wipe off the residue.
    c. Apply the Numatics Valve Cleaner again. DO NOT RUB. Let dry then wipe off all residue from the spool.

WARNING

You MUST adhere to the acetone manufacturer's warnings/cautions listed when cleaning the solenoid valve/spool assembly.

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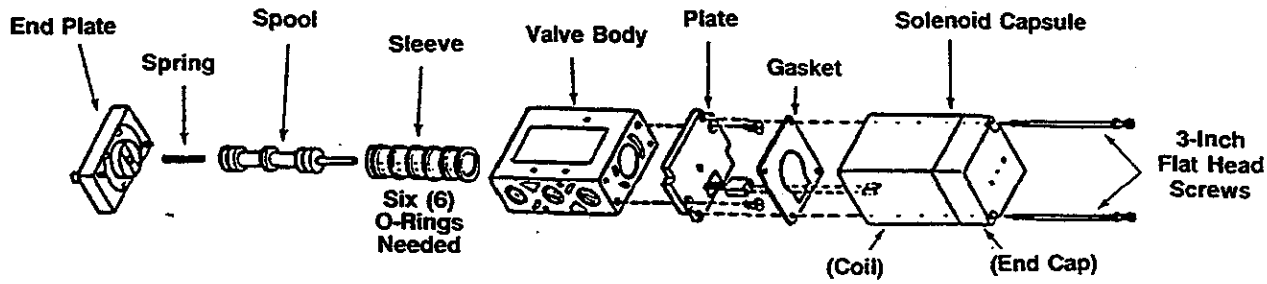

FIGURE 1 — CLEANING THE SPOOL/SLEEVE ASSEMBLY

d. After the valve cleaner has been wiped off the second time, let the spool soak in acetone.

e. After the spool has been removed from the acetone and let dry, blow out any contaminates or moisture possibly left in the spool with compressed air.

11. **To clean the sleeve assembly:**

WARNING

DO NOT use a hard/sharp instrument that may damage the sleeve assembly.

a. Remove the O-rings from the sleeve assembly using a plastic knitting needle (or equivalent) to remove the O-rings from the O-ring grooves on the sleeve assembly.

WARNING

DO NOT use Numatics Valve Cleaner to clean the sleeve assembly as residue from the cleaner cannot be completely removed from the inner diameter of the sleeve.

b. After the O-rings have been removed from the sleeve assembly, soak the sleeve assembly in acetone. After the sleeve has soaked in acetone for a few minutes, agitate the sleeve in the acetone to completely remove all contaminates.

WARNING

You MUST adhere to the acetone manufacturer's warnings/cautions listed when cleaning the solenoid valve/spool assembly.

c. After the sleeve has been removed from the acetone and let dry, blow out any contaminates or moisture possibly left in the sleeve.

WARNING

DO NOT use any cleaning tools (brushes, pads, etc.) to clean the inside of the sleeve.

d. Replace the O-rings on the sleeve assembly by pushing the O-rings onto the sleeve and into the sleeve assembly grooves.

NOTE: If a kit is used, there will be a total of eight (8) O-rings but only six (6) are needed. Two (2) are spares.

12. To replace the spool, carefully align the spool with the sleeve assembly.

WARNING

DO NOT tilt the spool or force it into the sleeve as damage may result.

13. Gently turning spool, insert it into sleeve.
14. To replace the sleeve, gently push/twist the sleeve into the valve body.
15. The sleeve should be roughly centered in the valve body.
16. Insertion of the end plates and bumper/spacers will correctly locate the assembly in the valve body.

REINSTALLING THE SPOOL/SLEEVE AND NEW SOLENOID CAPSULE (FIGURE 1)

1. Reinstall the endplate on the spool/sleeve assembly making sure that the spring is positioned properly in the endplate and in the center of the spool.
2. Plug the white connector into the solenoid before assembling the solenoid assembly to the spool/sleeve assembly.
3. Install the new coil and new end cap making sure that the rubber gasket is positioned properly on the solenoid assembly.
4. Reinstall the inlet filter.

REPLACING THE HOSE FROM THE MIDDLE CONNECTOR OF THE 4-WAY VALVE ASSEMBLY TO THE HEAT EXCHANGER (FIGURE 2)

NOTE: The 8-inch stainless steel spring must be replaced but only change the hose if residue is apparent.

NOTE: When removing the clamps from the hoses, use either a screwdriver or a 1/4-inch socket wrench.

1. Remove the hose that runs from the heat exchanger to the middle connector of the 4-way valve assembly.

WARNING

Do not overtighten the clamps that secure the hoses to the heat exchanger. The heat exchanger is made of soft aluminum and if overtightened, the tubing will collapse.

2. Route the new 11-inch PVC hose with spring from the heat exchanger to the middle connector on the 4-way valve assembly and secure with adjustable clamps.
3. Reinstall the clear tubing to the bottom of the flowmeter.
4. Reinstall control panel.
5. Attach cabinet assembly to the base assembly.

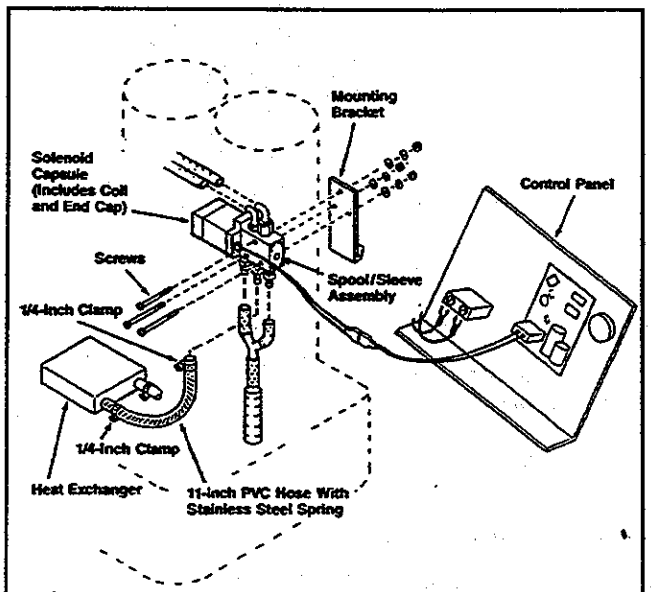

FIGURE 2 — REPLACING THE HOSE FROM THE MIDDLE CONNECTOR OF THE 4-WAY VALVE ASSEMBLY TO THE HEAT EXCHANGER

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Form No. 91-170 (P/N 2001187) Rev. 9/92

PROCEDURE 2 - PREVENTIVE MAINTENANCE

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

NOTE: The Invacare Concentrators are specifically designed to minimize routine preventive maintenance at intervals of once per year. In places with high dust or soot levels, maintenance may need to be performed more often. The following must be performed to assure years of additional reliable service. Only authorized or factory-trained personnel should perform preventive maintenance on the concentrator. Power should be disconnected before beginning preventive maintenance on the Invacare concentrator.

Cabinet Filters (FIGURE 1)

1. Clean or replace gross particle **(cabinet)** filters on both side of the cabinet.

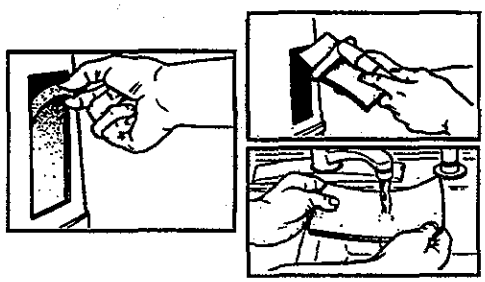


FIGURE 1 - CABINET FILTERS

Inlet Filter (FIGURE 2)

NOTE: Perform this procedure as needed depending upon the environment the concentrator is used in.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**
3. Unscrew the inlet filter located on the top left of the sound box **(counterclockwise).**
4. Discard existing inlet filter and replace with a **NEW** inlet filter.
5. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

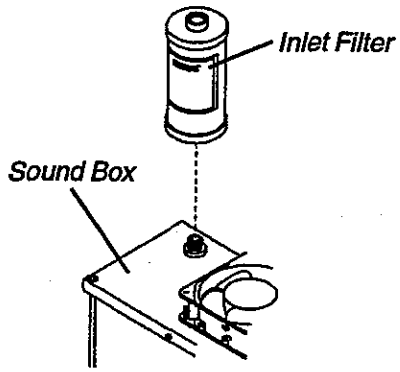


FIGURE 2 - INLET FILTER

Bacteria Filter (FIGURE 3)

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

NOTE: The bacteria filter is accessible without removing the control panel but, if it becomes necessary to loosen the control panel to access the bacteria filter, refer to PROCEDURE 9 - REMOVING CONTROL PANEL.

3. Remove **FRONT** of bacteria filter from the tygon tubing extending to the top fitting of the flowmeter.
4. Remove **REAR** of bacteria filter from the tygon tubing extending to back of in-line check valve.
5. Install **NEW** bacteria filter by reversing **STEPS 3-4.**
6. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

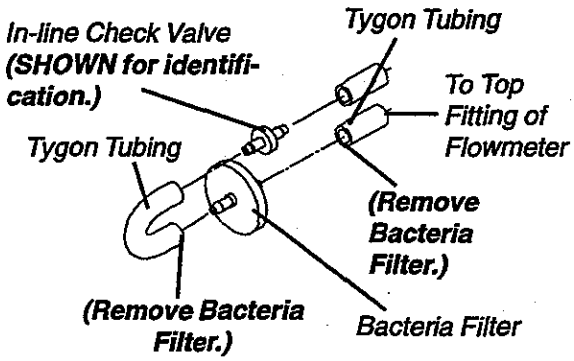


FIGURE 3 - BACTERIA FILTER

PROCEDURE 2 (continued) - PREVENTIVE MAINTENANCE

Exhaust Muffler Canister/Exhaust Muffler (FIGURE 4)

NOTE: The following should be performed at 20,000 hr. intervals although these procedures can be performed as needed depending upon the environment the concentrator is exposed to.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**
3. Remove the ty-wraps that secure 4-way Valve manifold exhaust tubing to top fittings of muffler canister **(canister).**
4. Disconnect the exhaust hoses from fittings on top of canister.
5. Remove mounting screw from rear of sound box and remove muffler canister.
6. Unscrew **(counterclockwise)** the exhaust muffler located on the muffler canister.
7. Inspect muffler canister for restriction of the internal filtration and do one of the following:
   a). Replace muffler canister and muffler if plugged or restricted.
   b). Install **NEW** exhaust muffler if canister is in good condition.
8. Install **NEW**/re-install existing muffler canister by reversing **STEPS 3-5.**
9. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

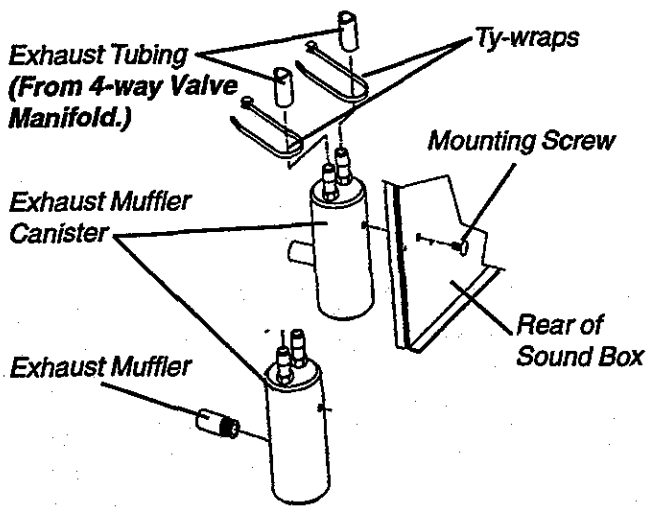


FIGURE 4 - EXHAUST MUFFLER CANISTER/ EXHAUST MUFFLER

Cleaning Finned Heat Exchanger (FIGURE 5)

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

CAUTION
DO NOT damage fins of heat exchanger when removing, cleaning, or reinstalling.

3. Remove heat exchanger **(Refer to PROCEDURE 8 - REPLACING HEAT EXCHANGER).**
4. Remove excessive dirt build-up on heat exchanger fins using compressed air.
5. Reinstall heat exchanger **(Refer to PROCEDURE 8 - REPLACING HEAT EXCHANGER).**
6. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

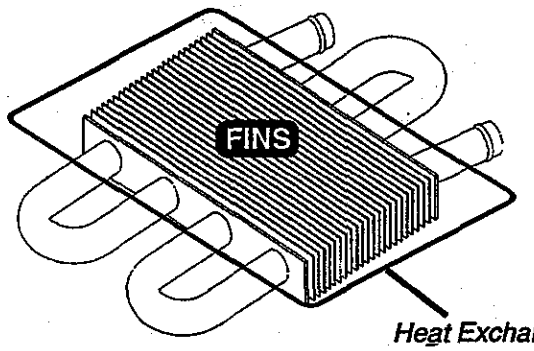


FIGURE 5 - CLEANING FINNED HEAT EXCHANGER

PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

NOTE: This kit is designed for rebuilding the Thomas Model 2638 CE 44 or 2618 CE 44. These compressors use this rebuild kit. The serial number is located on the front of the compressor. If the serial number does not begin in this way, this kit will not work.

The 3-Liter Thomas 2638 or 2618 Compressor Rebuild Kit contains the following:

1. Two (2) Connecting (**Piston**) Rod Assemblies.
2. Two (2) Connecting Rod Screws.
3. Two (2) Aluminum Piston Sleeves.
4. Four (4) Valves.
5. Two (2) Valve Restraints.
6. Two (2) Head Gaskets.
7. Two (2) Valve Plate Gasket.
8. Two (2) Connecting Rod Screw.
9. Twelve (12) Head Mounting Screws.
10. Four (4) Valve Screws.
11. Four (4) Connector (**Crossover**) Tube "O" Rings.
12. Hernon # 846 Lubricant.
13. Hernon # 423 Threadlocker.

Tools Required:

One (1) 1/8 and 5/32-inch Allen Wrench attachment.
Inch Pound Scale Torque Wrench.
One (1) Common (**Flathead**) Screwdriver.
One (1) Small Common (**Flathead**) Screwdriver.
One (1) Phillips Head Screwdriver.

Removing and Marking the Compressor Heads and Replacing Crossover Tube "O" Rings (FIGURE 6)

1. Unplug concentrator.
2. Carefully remove compressor from concentrator. **(Refer to PROCEDURE 7 - REPLACING COMPRESSOR ASSEMBLY OR CAPACITOR).**
3. Use the Phillips screwdriver to remove the twelve (12) screws that secure the head assembly and valve plates to the compressor.
4. Mark the heads and valve plates to ensure proper reinstallation and set valve plates aside.
5. Grasp both head assemblies and gently pull them apart.
6. Remove the crossover tubes from the head assembly.

NOTE: Replace all four (4) "O" rings.

7. Use a small flat screwdriver to get between the edge of the "O" rings and grooves in the crossover tubes or roll the "O" rings out of the grooves and remove from crossover tubes.
8. Slide NEW "O" rings into the grooves at each end of the crossover tubes.
9. Gently reinstall the crossover tubes into the end of one (1) compressor head.
10. Reinstall the remaining head onto the ends of the crossover tubes.

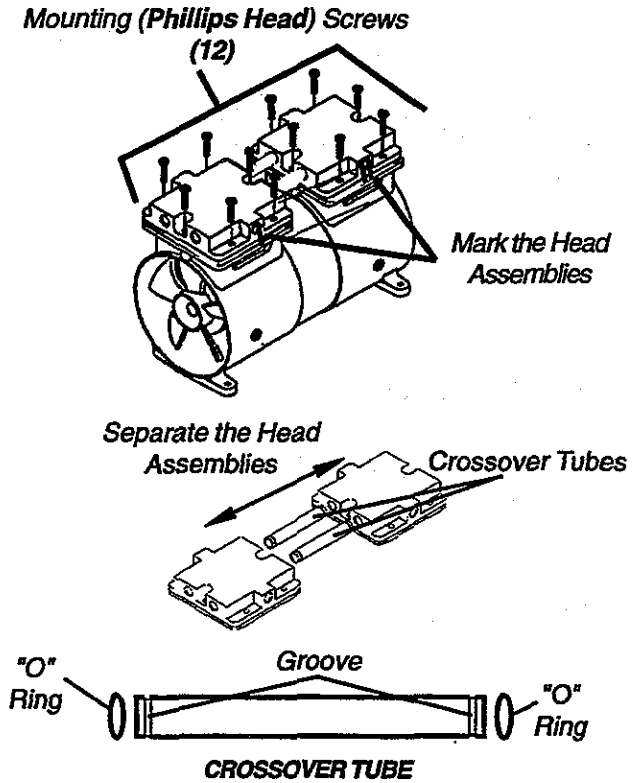


FIGURE 6 - REMOVING AND MARKING THE COMPRESSOR HEADS AND REPLACING CROSSOVER TUBE "O" RINGS

NOTE: After removing the head assembly, reinstall Valve Plate onto the side opposite the piston being rebuilt. This restricts movement of the other piston and prevents possible damage to the components.

PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)

Removing the Piston - 3 Liter Compressor (FIGURE 7)

1. Place the screw driver blade between the fan and the eccentric bearing and remove the fan blade from the side of the compressor being rebuilt by gradually prying it off.
2. Locate and align the eccentric set screw with the eccentric set screw access hole on the opposite side of the compressor body.
3. Use the 1/8-inch Allen wrench to loosen the set screw.

NOTE: DO NOT remove the eccentric set screw; loosen it ONLY.

4. Situate compressor so the piston being rebuilt is to your right and locate the connecting rod set screw access hole located on the lower portion of the compressor.
5. Use the 5/32-inch Allen wrench to remove the set screw located at the base of the connecting rod.

NOTE: It may be necessary to pry the spread point of the connecting rod to loosen it from the bearing of the eccentric.

6. Carefully slide the eccentric out of the compressor housing and set aside.
7. Remove the aluminum sleeve from the piston.
8. Tilt the piston slightly and with the other hand, slide the lower portion of the piston around the camshaft and out through the side of the compressor.

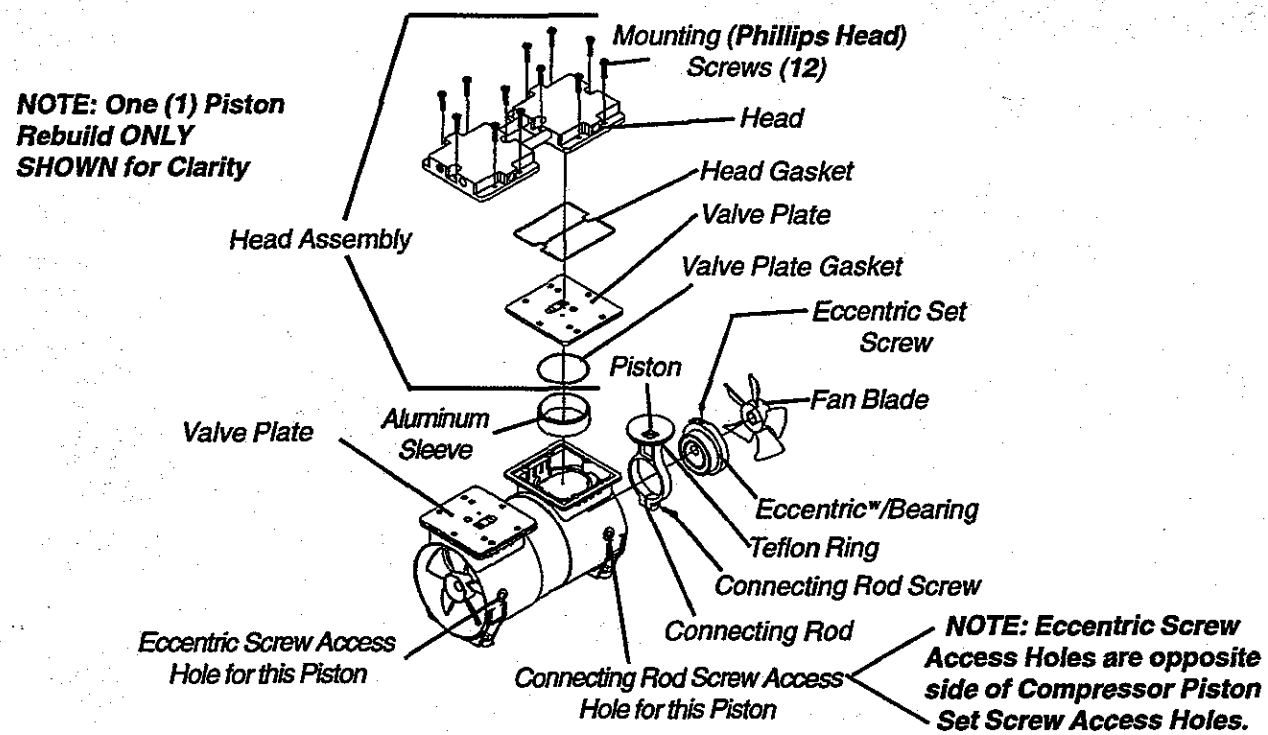


FIGURE 7 - REMOVING THE PISTON - 3 LITER COMPRESSOR

PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)

Installing the New Piston (FIGURE 8)

WARNING
DO NOT lubricate or use oil on any moving parts. The compressor eccentric uses a precision sealed bearing.

1. Place a bead of Hernon # 846 on your finger and apply around the inside of the bearing bore of the new connecting rod.
2. Install the new piston by inserting the piston head through the side of the compressor body.
3. Continue moving piston up into the upper compressor housing with the connecting rod situated around the eccentric nib (camshaft).

CAUTION
The eccentric set screw MUST face the flat spot on the eccentric nib (shaft). Failure to do so may cause damage to the compressor.

4. Reinstall the eccentric ensuring that the bearing on the eccentric sits inside the piston connecting rod.
5. Align the front face of the connecting rod with the front face of the bearing leaving a clearance of .032 (1/16-inch).
6. Apply a small amount of Hernon #423 to threads of connecting rod screw.
7. Install connecting rod screw and torque to 15 in. lbs. **DO NOT OVERTIGHTEN.**

CAUTION
DO NOT force aluminum sleeve onto piston. The Teflon ring may become damaged and make the piston unusable.

8. Turn the eccentric until piston is in the full up position.
9. Place the aluminum sleeve partially over the piston head at a 45° angle with the tooled edge up.
10. Hold the piston in place and gently rotate the sleeve onto the piston head and down until it rests on the locator ribs of the compressor housing and over the piston.

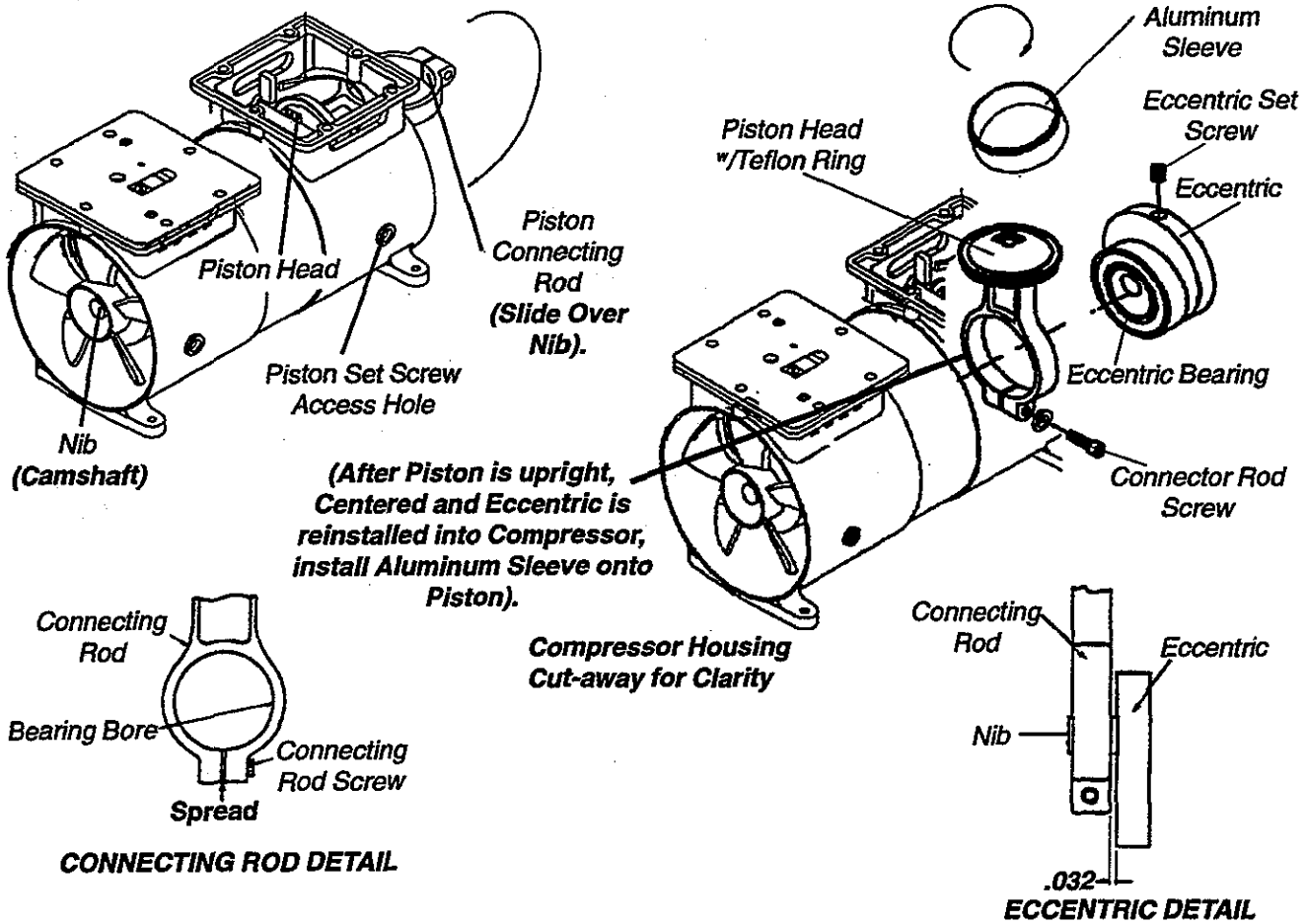


FIGURE 8 - INSTALLING NEW PISTON

PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)

Alignment of the Piston (FIGURE 8)

1. Hold sleeve down with one hand and slowly turn eccentric with the other.
2. As the piston travels up and down, the connecting rod will rock from front to back in normal operation.
3. If connecting rod rocks side to side, the rod is misaligned on the eccentric bearing.
4. If this is evident, loosen set screw and repeat **STEPS 3-8** for **INSTALLING THE PISTON.**
5. If connecting rod cannot be properly aligned, contact **Invacare Technical Service.**
6. Twist the aluminum sleeve back up onto the piston until sleeve is approximately centered on the teflon ring of the piston.
7. With the aluminum sleeve firmly seated onto locator ribs, set the individual valve plate from that side of the compressor onto the aluminum sleeve and position it until the six (6) holes in the valve plate line up with the six (6) holes in the top of the compressor housing. This aligns the piston assembly.
8. Securely tighten the connecting rod screw against the flat spot on the nib **(camshaft) (FIGURE 3).**

CAUTION

Ensure that eccentric set screw is aligned with the flat spot on the cam shaft. Failure to do so may result in damage to compressor or possible injury.

9. Reinstall the fan blade securely over the nib in front of the eccentric **(FIGURE 3).**
10. Temporarily reinstall the valve plate for the piston just replaced to simplify installation of the other piston.
11. Begin at **FIGURE 2** for installation of the new piston on the opposite side of the compressor.

Replacing the Top and Bottom Valves and Gaskets (FIGURE 9)

NOTE: Ensure that when installing the new valves, they are facing in the same direction that the old ones were in when removed from each plate and that they completely cover the compression opening in the valve plate. Ensure that no dirt or grease contacts them as this may inhibit their ability to open and close properly and severely reduce the compressor's ability to adequately compress air.

CAUTION

Because of tooling of the valve keepers, ensure that the word "UP" on the valve keeper is facing you when installing the valve keepers.

1. Replace the top and bottom valves by doing one side of the valve plate at a time.
2. Use the small common **(flathead)** screwdriver to remove the valve screws securing the valve, valve keeper, and valve restraint to the valve plate.
3. Remove the valve keeper, and valve from the top of the valve plate.
4. Remove the bottom valve screw, valve keeper strip and valve from the bottom of the valve plate.
5. Remove the old gasket from the valve plate.
6. Reverse **STEPS 1-5** to install the **NEW** valves and gasket onto the valve plate.
7. Remove the old gasket in the head assembly and install the new gasket in the compressor head and the valve plate gasket into the underside of the valve plate.

*NOTE: **DO NOT** attempt to reinstall the head assembly at this time.*

8. After the other piston and valves have been replaced, install the valve plates over the aluminum sleeves ensuring that the valve keeper strip fits into the cut-out in the top of the piston.

NOTE: Ensure that the gaskets are not pinched or out of position when reinstalling the valve plates and the head assembly. Doing this will prevent leaks and lowsystem pressures.

9. Reinstall the head assembly onto the valve plates noting the markings made when the head assembly and valve plates were removed.
10. Tighten the screws in a criss-cross manner and torque to 45 in. lbs.
11. Reinstall the compressor.
12. Run unit and check for leaks around compressor hoses and crossover tubes.
13. If crossover tube(s) leak, gently rotate the tube(s) approximately 1/4-turn. Once "O" ring(s) seat themselves, leaks should stop. If not, contact Invacare Technical Service at the number on back page of this instruction sheet.

PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)

14. Take pressure readings to ensure proper system pressures **(Refer to PROCEDURE 21 - SIEVE BED PRESSURE TAP-IN KIT INSTALLATION AND BED PRESSURE CHECK in the IRC3LX/IRC5LX/IRC5LXO2 SERVICE MANUAL).**

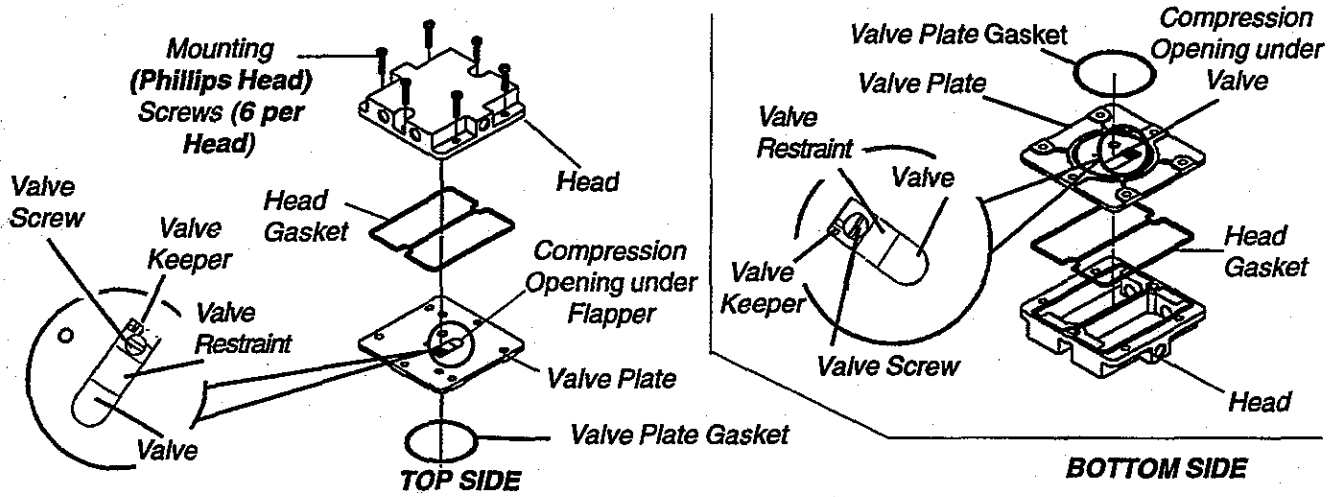


FIGURE 9 - INSTALLING THE TOP AND BOTTOM FLAPPERS AND GASKETS

PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

Compressor Top End Rebuild - 5 Liter

NOTE: This kit is designed for rebuilding the Thomas Model 2639 CE 44 or 2619 CE 44. These compressors use this rebuild kit. The serial number is located on the front of the compressor. If the serial number does not begin in this way, this kit will not work.

The 5-Liter Thomas 2639 or 2619 Compressor Rebuild Kit contains the following:

1. Two (2) Teflon Piston Rings
2. Two (2) Aluminum Piston Sleeves
3. Four (4) Valves
4. Four (4) Valve Restraints
5. Two (2) Head Gaskets
6. Two (2) Valve Plate Gaskets
7. Eight (8) Head Mounting Screws
8. Four (4) Valve Screws
9. Four (4) Connector (**Crossover**) Tube "O" Rings

Tools Required:

One (1) Phillips Head **TORX T-25** Driver.
One (1) Phillips #2 Screwdriver Attachment for Torque Wrench **(for Retainer Screws)**.
One (1) 1/8-inch Allen Wrench attachment for Torque Wrench **(for Eccentric Set Screw)**.
One (1) 5/32-inch Allen Wrench attachment for Torque Wrench **(for Rod Clamping Screw)**.
One (1) Common **(Flathead)** Screwdriver attachment **(for Valve Screw)**.

Removing and Marking the Compressor Heads and Replacing Crossover Tube "O" Rings (FIGURE 10)

1. Unplug concentrator.
2. Carefully remove compressor from concentrator. **(Refer to PROCEDURE 7 - REPLACING COMPRESSOR ASSEMBLY OR CAPACITOR).**
3. Use the **TORX T-25** torque wrench to remove the eight (8) screws that secure the head assembly and valve plates to the compressor.
4. Mark the heads and valve plates to ensure proper reinstallation and set valve plates aside.
5. Grasp both head assemblies and gently pull them apart.
6. Remove the crossover tubes from the head assembly.

NOTE: Replace all four (4) "O" rings.

7. Use a small flat screwdriver to get between the edge of the "O" rings and grooves in the crossover tubes and remove "O" rings from crossover tubes.
8. Slide NEW "O" rings into the grooves at each end of the crossover tubes.
9. Gently reinstall the crossover tubes into the end of one (1) compressor head.
10. Reinstall the remaining head onto the ends of the crossover tubes.

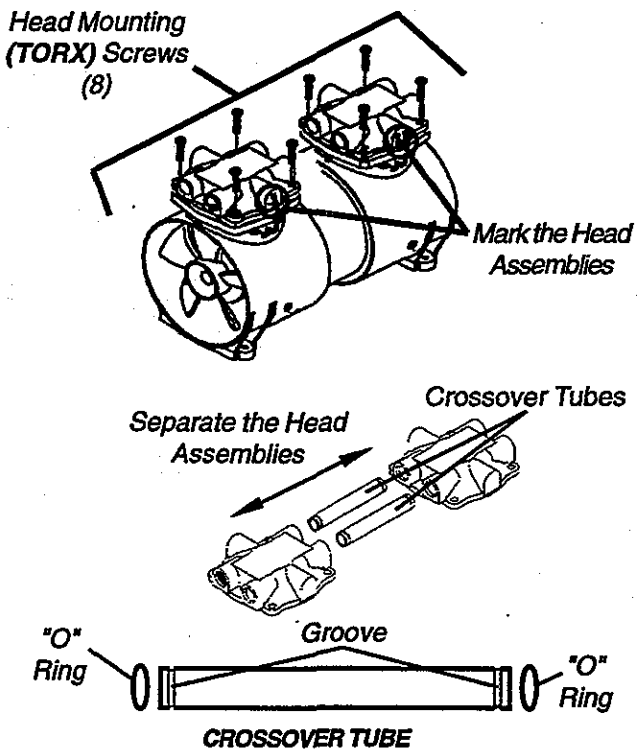


FIGURE 10 - REMOVING AND MARKING THE COMPRESSOR HEADS AND REPLACING CROSSOVER TUBE "O" RINGS

NOTE: After removing the head assembly, reinstall Flapper Plate onto the side opposite the piston being rebuilt. This restricts movement of the other piston and possible damage to the components.

WARNING
DO NOT lubricate or use oil on any moving parts. The compressor eccentric uses a precision sealed bearing.

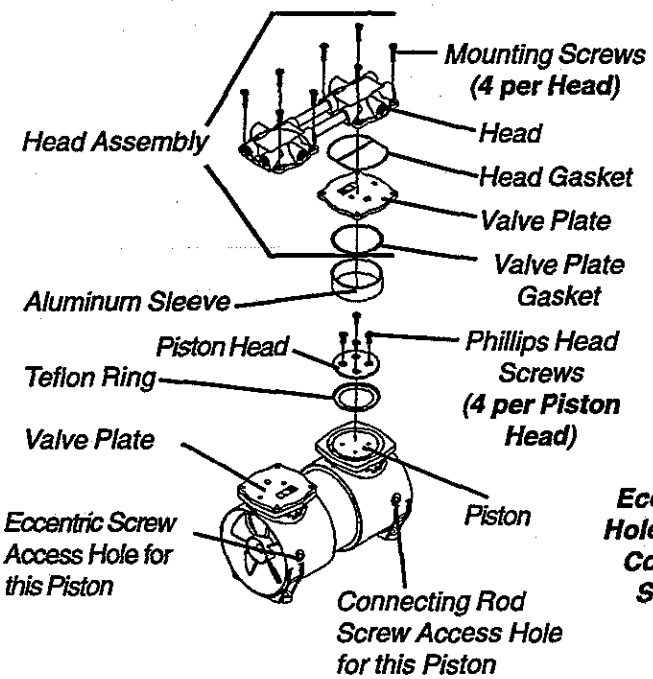
PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)

Removing the Piston Head and Teflon Ring (FIGURE 11)

NOTE: An Allen wrench may be inserted into the connecting screw to keep to keep it from moving.

1. Remove the aluminum sleeve from the piston to be rebuilt.
2. Remove the four (4) phillips screws on the top of the piston and remove the piston head and Teflon ring.
3. Discard the old teflon ring.
4. Remove any debris from top of piston.
5. Repeat **STEPS 1-4** for other piston.

One (1) Piston Rebuild ONLY SHOWN for Clarity



Eccentric Screw Access Holes are opposite side of Compressor Piston Set Screw Access Holes.

FIGURE 11 - REMOVING THE PISTON HEAD AND TEFLON RING

PROCEDURE 2 - PREVENTIVE MAINTENANCE (continued)

Installing the New Teflon Rings and Piston Heads (FIGURE 12)

CAUTION
Piston head MUST be rotated 90° when reinstalling. This ensures proper wear on the piston head and will prolong it's life.

1. Place the aluminum sleeve onto its mounting position on the compressor housing.
2. Rest the new Teflon ring on the aluminum sleeve and center the ring with the piston head.
3. Install the piston head over the piston ring and into the aluminum sleeve.
4. Install and tighten the phillips head screws until snug to align the Teflon ring with the aluminum sleeve.
5. Once the Teflon ring is centered properly with the piston head and aluminum sleeve, torque the screws to 30 in. lbs.

CAUTION
DO NOT force aluminum sleeve onto piston. The Teflon ring may become damaged and render the piston unusable.

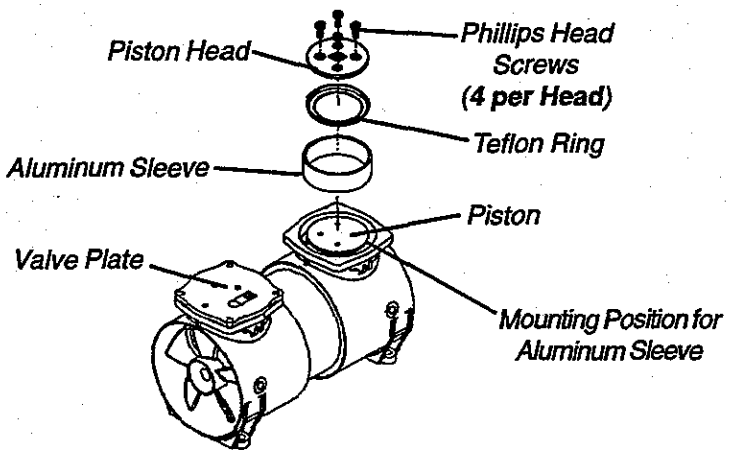


FIGURE 12 - INSTALLING THE NEW TEFLON RINGS AND PISTON HEADS

Installing Top and Bottom Flappers (FIGURE 13)

NOTE: Ensure that new valves are facing in the same direction that the old ones when installing and that they completely cover the compression opening in the valve plate. Make sure that no dirt or grease contacts the valves or valve plates as this may inhibit their ability to open and close properly and severely reduce the compressor's ability to adequately compress the air. Replace the top and bottom valves by doing one side of the valve plate at a time.

CAUTION
Because of tooling of the valve keepers, ensure that the word "UP" on the valve keeper is facing you when installing the valve keepers.

1. Use the small common **(flathead)** screwdriver to remove the valve screw securing the valve restraint, valve keeper, and valve to the top of the valve plate.
2. Remove the valve screw, valve keeper, and valve from the bottom side of the valve plate.
3. Reverse **STEPS 1-2** to install the **NEW** top and bottom valves onto the valve plate.
4. Torque valve screws to 12 in. lbs.
5. Install the head gasket in the compressor head and the valve plate gasket into the underside of the valve plate.
6. After the other piston has been rebuilt, install the valve plates over the aluminum sleeves and reinstall the head assembly onto the valve plates noting the markings made when the head assembly and valve plates were removed.

NOTE: Ensure that the gaskets are not pinched or out of position when reinstalling the valve plates and the head assembly. Doing this will prevent leaks and low system pressures.

7. Tighten the screws on the heads in a criss-cross manner until snug. **DO NOT** tighten completely.
8. Use a torque wrench with the **TORX T-25** drive and torque each head screw to 40 in. lbs. in a criss-cross manner.
9. Reinstall the compressor **(Refer to PROCEDURE 7 - REPLACING COMPRESSOR ASSEMBLY OR CAPACITOR).**
10. Run unit and check for leaks around compressor hoses **(Refer to PROCEDURE 19 - LEAK TEST).**
11. If crossover tube(s) leak, gently rotate the tube(s) approximately 1/4-turn. Once "O" ring(s) seat themselves, leaks should stop. If not, contact Invacare Technical Service at the number on back page of this instruction sheet.
12. Take pressure readings to ensure proper system pressures (Refer to **PROCEDURE 21 - SIEVE BED PRESSURE TAP-IN KIT INSTALLATION AND BED PRESSURE CHECK** in the **IRC3LX / IRC5LX/ IRC5LXO2 SERVICE MANUAL).**

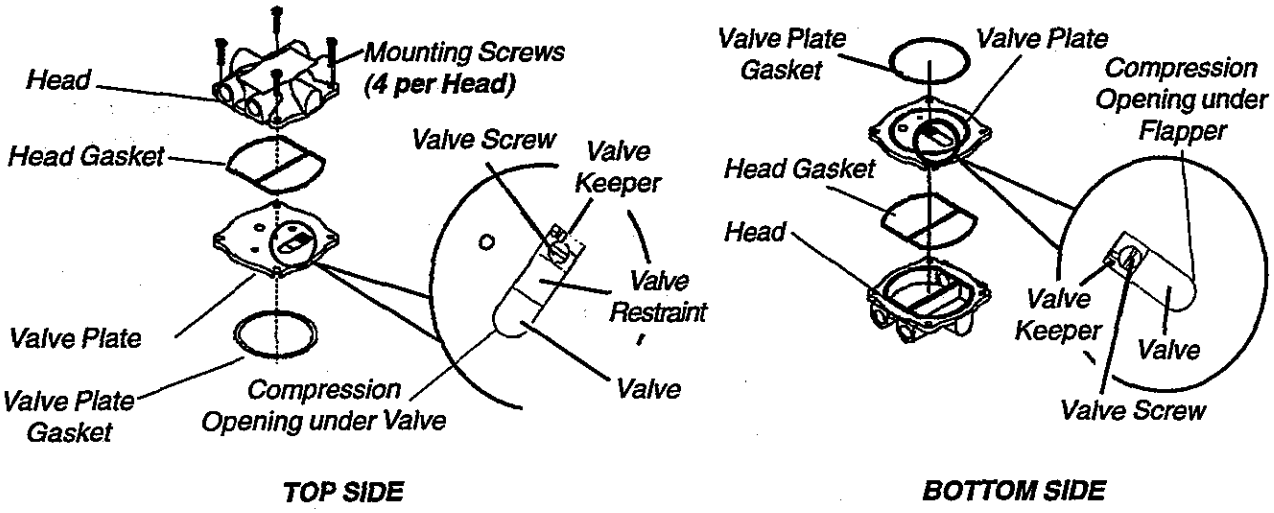
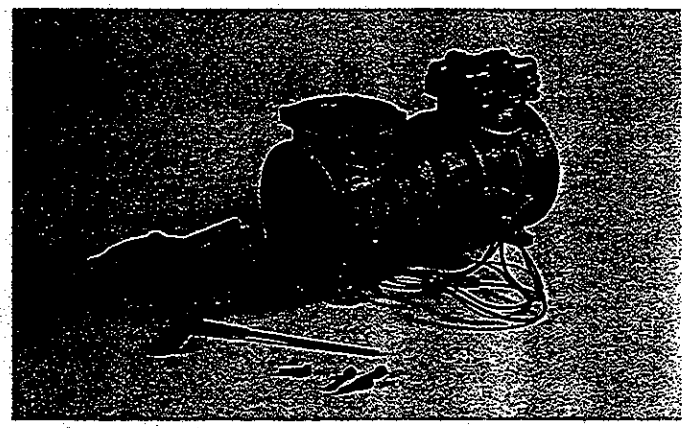


FIGURE 13 - INSTALLING THE TOP AND BOTTOM FLAPPERS AND GASKETS

Feature

Thomas 2619 rebuild kit

The Thomas double WOB-L® compressor is the most widely used compressor in the industry. Estimates are that over 500,000 Thomas compressors are still being used in this industry. That would definitely be considered as the lion's share. The compressor has been, and always will be an item of service. With today's cost-conscious companies, proper maintenance of this vital component is a must. Having the components to rebuild the compressor is but half the battle, the rest is know-how! With so many service centers begging for your business, can all of them be doing it properly? It's tough to say... however, if you have what it takes you can do it yourself and after reading this article you can do it right! We will discuss the proper installation and test procedure of the Thomas 2619 series compressor.



STEP 1: Mark the compressors intake, exhaust and fans. Then remove the "head" screws.
STEP 2: Remove all gaskets, seals and o-rings.
STEP 3: Valve plate rebuild: Remove flappers from 1 (ONE) plate, you will need the other for use as a template.
STEP 4: Now clean the plate with hot soapy water, acetone . After cleaning install the new valve flappers and flapper restraints. *Required tools (standard screwdriver and 7/16 or 3/8 wrench)*

Note: You must replace the flapper restraints, if they are not replaced your valve seal may not be very tight. In this case your compressor will recirculate air and lose volume/pressure.

STEP 5: Upon completion of the valve plates you should replace all gaskets and seals. With the head gaskets and sleeve o-rings you may need to scrape them out. *Suggested tool (Awl or small screwdriver)*

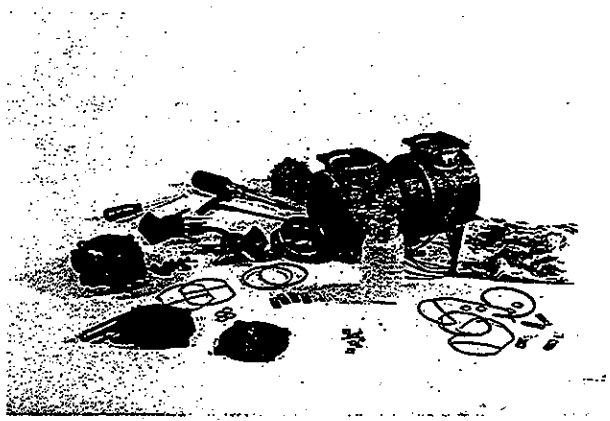
STEP 6: Now that all gaskets and seals have been replaced we are ready to rebuild the pistons. Some prefer rebuilding with the cylinder sleeves installed, so we will discuss both methods.

METHOD 1: With the cylinder sleeve installed, remove the 4 piston top screws. These screws will not be found at the local hardware store so be very careful not to strip them. In the event of a difficult screw remove the cylinder sleeves and use a propane torch to expand the metal surrounding the screw, that should do the trick.

Note: BE CAREFUL not to burn the stator or bearings! If this occurs major repair will be necessary.

M1 Step 1: After all screws have been removed remove the piston cup seal. To install the new seal bring the piston to the top of its stroke. Now get your Loc-tite brand thread sealant and put one drop on each of the four piston top screws. Place the new cup seal in the cylinder sleeve and match the top plate with the screw holes. You will notice a small *notch* in the center of the top plate. There will also be indentations of the flapper on the intake side of the piston top plate. If you like you can match these to the original configuration, however, it is not necessary. Now insert the screws with the thread sealant and tighten in an "X" configuration. This will ensure a good fit. As you tighten the top plate watch the cup material, guide it down to keep it from going off center.

CAUTION: When bringing pistons to the top of their stroke, you can damage the cup material on the opposing side. This of course is not a problem when working on the first piston.



--Step 6 cont.

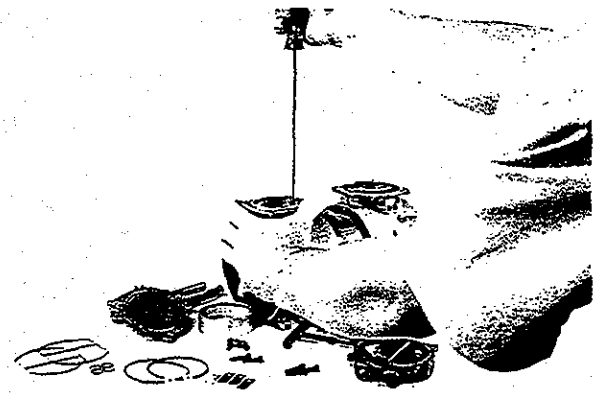
METHOD 2: Remove the cylinder sleeves. Now loosen the eccentric set-screw. There is a hole in the side of the compressor housing to access the eccentric set-screw.

Required tool 1/8 allen "T"-handle.

When the eccentric is loose, you will need to do the same with the piston.

Required tools 5/32 allen "T"-handle and a standard screwdriver to separate the 2 halves of the piston.

After the piston is loose you can pull the piston and eccentric off of the shaft. In many cases the eccentric is too tight to pull it off, if so, you should use ZEP-45 lubricant or equivalent, then use a

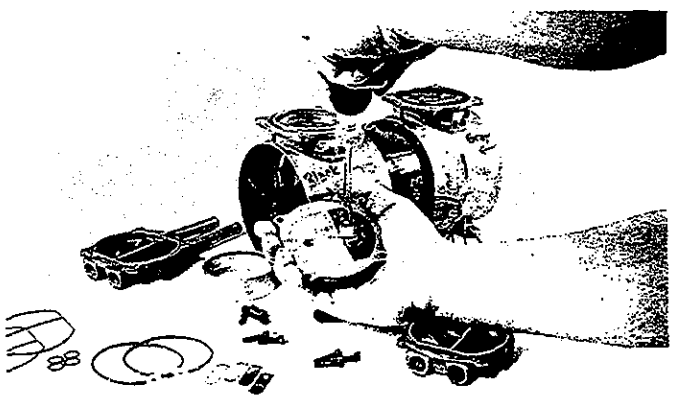


screwdriver (inserted in the hole for loosening the eccentric) to remove the eccentric.

CAUTION: DO NOT use heat or flame as this will cause heat damage to the eccentric bearing!

After removal of the piston, inspect the eccentric bearing for damage or looseness, shake the bearing and listen for rattles, if the bearing needs replaced see STEP 9.

place the piston in a vice and remove all of the piston top screws. DIFFICULTIES?---see Method 1 On all 4 of the piston top screws put a drop of thread sealant. Now install the new cup seal by aligning the top plate to the connecting rod. Tighten the 4 screws in an "X" pattern.



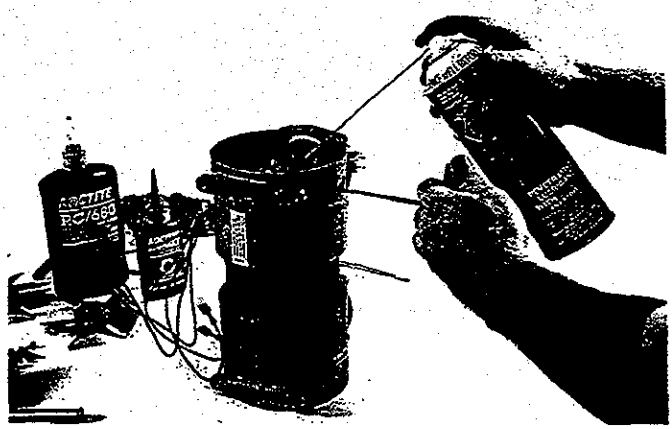
After the piston has been assembled, insert it in the compressor.

Note: Watch the piston screw to make sure you can tighten it through the hole in the housing. Re-install the eccentric, spread the piston apart with your standard screwdriver. Next tighten the piston on the eccentric bearing with 15 in lbs of torque.

Required tool 5/32 15 inch pound torque "T"-handle

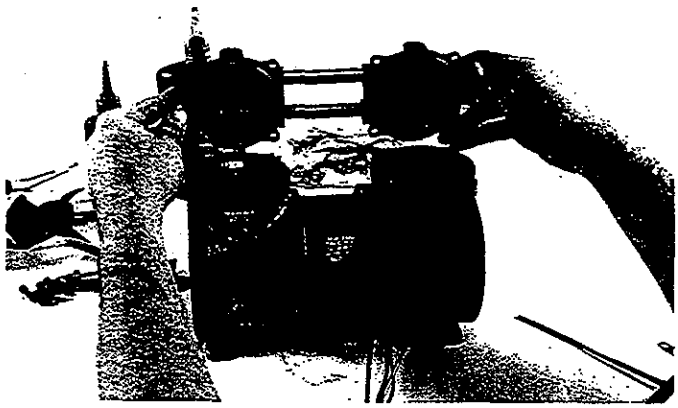
After tightening the piston tighten the eccentric, then back it off until you hear a "pop". This will allow the eccentric to *"spin-balance"*.

STEP 7: After completing Step 6 to both pistons, re-assemble the compressor. (Watch the marks that you put on the heads/housings to determine the configuration)



STEP 8: This step is only needed when using Method 2 of Step 6) Now we are ready to spin-balance the compressor. DO NOT INSTALL THE COMPRESSOR IN THE CONCENTRATOR! You will need to make a test lead to start the compressor out of the concentrator. ---With the assembled compressor connected to a test lead (AC power side) and the other leads connected to the capacitor, start the compressor. Cover the intake side of the compressor, you will notice a clicking noise, this is normal. The sound is the eccentrics slapping on the shaft. This action will help balance the eccentric

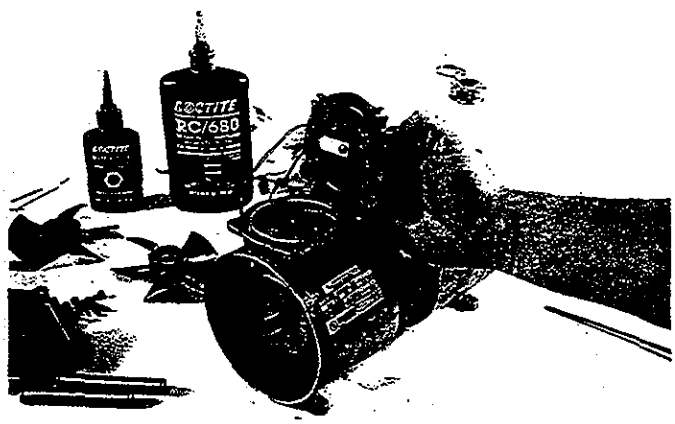
--Step 8 cont.
and make them set perpendicular to the rotor shaft and parallel to the cylinder sleeve. Now cover the exhaust side of the compressor to make the unit run with back-pressure. This will help seat the eccentric before tightening the set screw. Now stop the unit, tighten the eccentric set screws and your done.
Require Tool 1/8 allen "T"-handle.

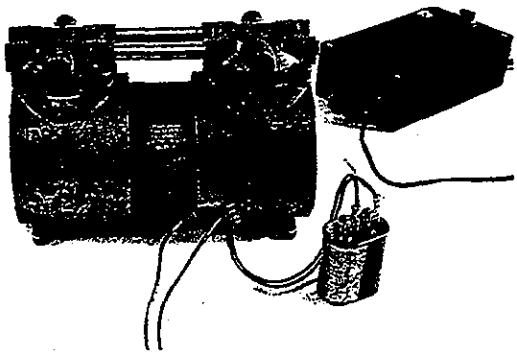


Thomas industries recommends using only LOC-TITE brand products. Use RC-680 for bearings and 241 Thread LOC for screws. If all steps are followed properly and your inner (rotor) bearings are good your compressor should last approximately 5,000 to 7,500 hours. We can not guarantee those performance figures, however they should be close. The compressor is subject to many uncontrollable variables to guarantee identical results for each rebuild. Take these into consideration when scheduling your next maintenance. We strongly recommend replacing eccentric bearings when installing a service kit. If eccentrics are replaced your rebuild should perform better and last much longer. No service kit could ever make the difference like a complete rebuild, so be fore-warned. Do not expect you compressor to be like a new unit, remember you have only installed a maintenance kit. The rotor bearings could be on their way out just as you put in your service kit!

If you have any comments or need further assistance please call our TOLL-FREE number (800) 937-1267.

In the event of bad eccentric bearings.....
STEP 9: When you have bad eccentric bearings you can replace the bearings if you have the appropriate machinery. In this event you will need an arbor press and a bearing puller or equivalent. Remove the bearing from the eccentric, discard the bearing and press the new bearing on. When pressing you will need to press the bearing to the STOP POINT that is machined into each eccentric. This stop point will allow the bearing to be slightly counter-sunk.
Otherwise send them in for refurbishing. Now reinstall using STEP 6 Method 2.





TROUBLESHOOTING GUIDE

IRC 301/501 and $SensO_2$ IRC301O2/501O2

NOTE: Diagnostic symbols or situations that are exclusive to units equipped with the $SensO_2$ feature, will be noted in this guide.
NOTE: Refer to the Parts Guide Replacement Procedures following the Troubleshooting Guide for proper replacement or adjustment procedures.

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
NORMAL OPERATION: **P.C. BOARD L.E.D. INDICATORS:** **RED:** Off **GREEN:** Off Unit plugged in, power switch on. Alarm on, "3 beeps" on start up.	No problems.	System O.K.
POWER LOSS: **P.C. Board L.E.D. Indicators:** **RED:** Off **GREEN:** Off Unit unplugged, power switch on, alarm off.	No problems.	"Battery Free™" Circuit drained. Plug in cord and turn power switch ON to recharge.
POWER LOSS: **P.C. BOARD L.E.D. INDICATORS:** **RED:** Off **GREEN:** Off Unit plugged in, power switch on, alarm off. "Battery Free™" circuit drained.	1. No power at outlet.	1. Check electrical outlet with a table lamp or voltmeter set on 150-200 VAC scale. If outlet is not working, check circuit breaker in home's electrical panel or consult an electrician. Also ensure that unit is plugged in properly. DO NOT use extension cords. Move to another outlet or circuit.
	2. Power Cord.	
	a. Frayed or cut cord.	2a. Replace cord.
	b. Broken or damaged spade connectors on plug.	2b. Replace power cord.
	c. Power cord molex connector loose or disconnected (inside back of unit).	2c. Reattach connector.
	3. On/Off switch.	
	a. Disconnected wire.	3a. Check all electrical connections to the On/Off switch for any disconnected wires.
	b. Faulty switch.	3b. If the concentrator does not come on at all, and wiring is intact, remove and clean the On/Off switch with contact cleaner while operating the switch back and forth. Reinstall the switch and turn power on. If the switch still doesn't work, replace the switch. Transfer one (1) wire at a time from the bad switch to the same contact on the new switch.
	4. Blown 10 AMP fuse.	4. Replace 10 AMP fuse located just above the line cord at the rear of the unit. **NOTE: Use only type 3 AG, 10 AMP slow blow fuse.** The fuse may have blown to safeguard the concentrator during a power surge. If the fuse blows immediately, there is probably a short in the wiring. Check for pinched or charred wiring. If fuse doesn't blow, turn unit on and run it for a couple of hours. If fuse blows during this run, there is probably an internal problem. Call Invacare Technical Service.

TROUBLESHOOTING GUIDE, CONTINUED

NOTE: Refer to the Parts Guide Replacement Procedures following the Troubleshooting Guide for proper replacement or adjustment procedures.

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
POWER LOSS, Continued	5. P.C. Board.	
	a. Damaged.	5a. Replace board. **FOR IRC501/501C/501O2 ONLY** - Unit may need retiming after board replacement. Refer to the timing section in this manual.
	b. Loose or damaged connector.	5b. Repair or replace connector.
INTERNAL POWER LOSS *SensO₂* **ONLY:** **P.C. BOARD L.E.D. INDICATORS:** **RED:** Off **GREEN:** Off Alarm may or may not be on. **CONTROL PANEL INDICATORS:** **RED** : Off **YELLOW** : Off **GREEN** : Off Fan operates, flowmeter light on, compressor not operating.	1. Transformer Assembly. a. Faulty.	1a. Replace transformer assembly. [Refer to Procedure 2 - Removing Control Panel (*SensO₂*)].
	b. Connector loose or disconnected.	1b. Reattach connector.
	c. Faulty wiring.	1c. Replace transformer assembly. [Refer to Procedure 2 - Removing Control Panel (*SensO₂*)].
	2. P.C. Board. Faulty.	2. Replace P.C. Board. **FOR IRC501/501O2 ONLY** - Unit may need retiming after board replacement. Refer to the timing section in this manual.
FLOW OBSTRUCTION: **P.C. BOARD L.E.D. INDICATORS:** **RED:** Flashing **GREEN:** Off Rapid "beeping" alarm. Compressor shut down after 5 minutes.	1. Flowmeter.	
	a. Set at 1/2 liter or less.	1a. Increase flow above 1/2 liter or more. If prescribed flow is 1/2 liter or less, use the IRCPF-16 Pediatric Flowmeter to ensure accurate flow level.
	b. Patient tubing pinched or obstructed.	1b. Replace tubing.
	c. Obstructed or defective humidifier bottle.	1c. Replace humidifier bottle.
HIGH PRESSURE: **P.C. BOARD L.E.D. INDICATORS:** **RED:** On **GREEN:** Off Unit plugged in, power switch on, continuous alarm. Compressor shut down. **(Failure to cycle due to high pressure).**	1. P.C. Board. a. Malfunction or disconnected wire.	1a. Set flow to 3 l/min. or 5 l/min. Locate molex connector between P.C. Board and solenoid valve. Check voltage across either side of molex connector on a 200 volt D.C. scale. If volt meter reads 0 volts when unit shuts down, replace board.

TROUBLESHOOTING GUIDE, CONTINUED

NOTE: Refer to the Parts Guide Replacement Procedures following the Troubleshooting Guide for proper replacement or adjustment procedures.

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
HIGH PRESSURE, Continued	b. Shifting valve at pressures in excess of 25 p.s.i.	1b. Replace P.C. Board. **FOR IRC501/501C/501O2 ONLY** - Unit may need retiming after board replacement. Refer to the timing section in this manual.
	2. Solenoid.	
	a. Valve seized.	2a. If voltage rises to approximately 95 to 100 volts when unit shuts down, P.C. Board is functioning properly. Clean, rebuild or replace solenoid valve spool/sleeve assembly.
	b. Bad coil.	2b. Replace coil. (Refer to Procedure 17 - Solenoid Valve General Cleaning / Rebuilding).
	3. Contaminated sieve beds.	3. Replace the sieve beds. Be sure to take pressure readings at both test points after replacing the beds to ensure proper system pressures. **Note:** Oxygen Outlet (Test Point 2) Yoke Assembly (Test Point 1)
LOW PRESSURE: **P.C. BOARD L.E.D. INDICATORS:** **RED:** On **GREEN:** On		
Unit plugged in, power switch on, continuous alarm. Compressor shut down. **(Failure to cycle due to low pressure).**	1. Inlet Filter. Dirty or plugged.	1. Replace inlet filter.
	2. Inline Filter. Dirty, plugged or leaking.	2. Replace inline filter.
	3. Compressor.	
	a. Leaks at fittings or tubing.	3a. Replace or repair.
	b. Leaking or defective relief valve.	3b. Repair leak or replace.
	c. Insufficient voltage at outlet.	3c. DO NOT use extension cords. Use another outlet.
	4. Check Valve.	
	a. Cracked or leaking diaphragm.	4a. Replace check valve. (Refer to Procedure 6 - Replacing Sieve Beds for check valve locations).
	b. Installed upside down.	4b. Reverse installation. The letters VAC appear on the bottom side of the check valve. This side must face down. (Refer to Procedure 6 - Replacing Sieve Beds for check valve locations).
	5. Heat Exchanger.	
	a. Leak at tubing or body chamber.	5a. Replace or retighten.
	b. Inspect tubing and heat exchanger.	5b. Replace or retighten tubing. Replace heat exchanger. (Refer to Procedure 8 - Replacing Cooling Fan for Heat Exhanger Location).
	6. Regulator. Cracked or leaking.	6. Replace.

TROUBLESHOOTING GUIDE, CONTINUED

NOTE: Refer to the Parts Guide Replacement Procedures following the Troubleshooting Guide for proper replacement or adjustment procedures.

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
LOW PRESSURE, Continued	7. P.E. Valve. (IRC 501/501C/501O2 ONLY). Leaking.	7. Replace P.E. valve. Check voltage at P.E. valve molex connector on 0-100 volt D.C. scale. The P.E. valve activates or energizes approximately 1 second prior to the energization of the 4-way valve with approximately 90 volts. If voltage is in excess of 100 volts consistently, replace the P.C. Board. If the P.C. Board voltage acts normally, replace the P.E. valve. **NOTE: Check for leaks starting at the compressor output through all the pneumatic connections. Major leaks will cause system pressures to remain below adequate shift (purge) pressures and will cause compressor shut down.**
LOW CONCENTRATION: **NOTE: Check for O_2 purity using a calibrated Oxygen Analyzer at Test Point 2 (OXYGEN OUTLET) of the concentrator.** **P.C. BOARD L.E.D. INDICATORS:** **RED:** Off **GREEN:** Off **CONTROL PANEL INDICATORS:** ***Sens*O_2 ONLY:** **RED** : On or Off **YELLOW** : On or Off **GREEN** : Off For *Sens*O_2 units, the Red indicator will signal extremely low purity and will be accompanied by a continuous alarm and a system shutdown. A Yellow indicator signals low purity, but within specification for the user. Repairs are required.	1. Cabinet Filter. Dirty. 2. Inlet Filter. Dirty. 3. Inline Filter. Dirty or leaking. 4. Check Valve. Cracked or leaking diaphragm. 5. Compressor. a. Defective. b. Faulty capacitor. c. Bad motor windings. d. Worn seals. e. Bearings bad. f. Leak at fittings or tubing. g. Leaking or defective relief valve. h. Insufficient voltage (outlet).	1. Clean or replace. 2. Replace filter. 3. Replace filter. 4. Replace check valve. (Refer to Procedure 6 - Replacing Sieve Beds for check valve locations). 5a. Replace Compressor. 5b. Replace Capacitor on Compressor. 5c. Replace Compressor. 5d. Replace Seals in Compressor. 5e. Replace Compressor. 5f. Replace or Repair. 5g. Replace or Repair. (Refer to Procedure 7 - Replacing Compressor Assembly for relief valve locations). 5h. Do not use extension cords. Use another outlet.

TROUBLESHOOTING GUIDE, CONTINUED

NOTE: Refer to the Parts Guide Replacement Procedures following the Troubleshooting Guide for proper replacement or adjustment procedures.

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
LOW CONCENTRATION, Continued	6. Heat Exchanger.	
	a. Leak at tubing or chamber.	6a. Replace or retighten.
	b. Inspect tubing and heat exchanger.	6b. Replace or retighten tubing. Replace heat exchanger. (Refer to Procedure 8 - Replacing Cooling Fan for Heat Exchanger Location).
	7. Regulator. Cracked or leaking.	7. Replace.
	8. Exhaust Muffler. Dirty or plugged.	8. Replace.
	9. Fan.	
	a. Not operating. Unit overheating.	9a. Leads to fan disconnected. Reconnect.
	b. Faulty fan.	9b. Replace.
	10. Sieve Beds.	
	a. Defective beds.	10a. Replace.
	b. Leaks at fittings or hose connections, ie., Yoke Assembly, Restrictor Assembly, P.E. Valve Tubing (IRC 501/501C/ 501O2 ONLY), Bed Inlet and Outlet Hoses.	10b. Retape, retighten or replace.
	11. Tubing. Kinked or blocked tubing.	11. Repair or replace.
	12. P.C. Board.	
	a. Shifts at wrong pressure.	12a. Check pressure at High Pressure Yoke. Pressure should rise to 20 p.s.i. at shift point. If not, replace P.C. Board.
	b. Pressure transducer tubing leaks.	12b. Inspect tubing at the transducer and at the product tank. Replace tubing ONLY if damage is evident. (Refer to Procedure 2 - Removing Control Panel).
	13. Flowmeter.	
	a. Cracked or broken fitting.	13a. Replace fitting.
	b. Input tubing leaking or loose.	13b. Repair or replace tubing.
	14. Timing. (IRC 501/501C/501O2 ONLY).	14. To accommodate for varying tolerances when replacing components, an adjustable timer is used to control the shifting of the Mobilaire V Pressure Equalization (P.E.) Valve. Refer to Timing of the Mobilaire IRC 501/501C/501O2.
	15. $SensO_2$ Only: Inspect P.C. Board restrictor tubing for kinks or tears.	15. Replace P.C. Board. FOR IRC501O2 ONLY - Unit may need retiming after board replacement. Refer to the timing section in this manual.
FLUCTUATING FLOW:	1. Regulator/Flowmeter.	
	a. Incorrectly set regulator.	1a. Check pressure at oxygen outlet (Test Point 2). Refer to the parts replacement guide for correct pressure adjustment of the regulator.

TROUBLESHOOTING GUIDE, CONTINUED

NOTE: Refer to the Parts Guide Replacement Procedures following the Troubleshooting Guide for proper replacement or adjustment procedures.

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
FLUCTUATING FLOW, Continued	b. Flowmeter malfunction.	1b. If flow is still unstable, check for leaks starting at the compressor output through all the pneumatic connections. If no leaks are found, and flow is still fluctuating, replace the regulator. If the pressure at Test 2 is within spec (5 p.s.i. ± 0.2 max. [34.4 kPa ± 6.89].), replace the flowmeter. Refer to the parts replacement guide for proper replacement of the flowmeter.
UNIT EXCESSIVELY LOUD:	1. Pneumatic Exhaust. a. Muffler cracked, damaged or missing. b. Muffler tubing disconnected or damaged. 2. Intake Resonator. Muffler cracked, damaged or missing. 3. Compressor. Internal damage.	 1a. Replace exhaust muffler. 1b. Replace tubing. 2. Replace resonator muffler. (Refer to Procedure 7 - Replacing Compressor Assembly for resonator muffler location). 3. Replace compressor.
UNIT OVERHEATS:	1. Base Exhaust Vent. Plugged or restricted. 2. Fan. a. Leads to fan disconnected. b. Defective fan. c. Fan upside down. 3. Heat Exchanger. a. Dirty or plugged. b. Fins damaged. 4. Compressor. a. Defective. b. Faulty capacitor. c. Bad motor windings. d. Worn seals. e. Bearings bad. 5. Cabinet Filter. Dirty or plugged. 6. Line Voltage. Excessive Line Voltage. (surge).	1. Place unit at least 3-inches from wall. DO NOT place unit on pile or shag carpeting that may restrict air flow. 2a. Reconnect leads. 2b. Replace fan. 2c. Install fan with vertical air flow arrow pointing downward. 3a. Clean heat exchanger. 3b. Replace heat exchanger. (Refer to Procedure 8 - Replacing Cooling Fan for Heat Exchanger Location). 4a. Replace compressor. 4b. Replace capacitor on compressor. 4c. Replace compressor. 4d. Replace seals in compressor. 4e. Replace compressor. 5. Clean or replace. 6. Have line voltage inspected by certified electrician. A voltage regulator may be required and can be obtained from the local electric company.

TROUBLESHOOTING GUIDE, CONTINUED

NOTE: Refer to the Parts Guide Replacement Procedures following the Troubleshooting Guide for proper replacement or adjustment procedures.

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
ALARMS AND INDICATORS UNIQUE TO UNITS WITH THE *SENS*O_2 FEATURE. **GOOD OXYGEN PURITY, NO PANEL INDICATORS ILLUMINATED** **P.C. BOARD L.E.D. INDICATORS:** **RED:** Off **GREEN:** Off **CONTROL PANEL INDICATORS:** **RED** : Off **YELLOW** : Off **GREEN** : Off Purity Switch setting at 73% or 85%: After 30 minutes of run time, unit operates normally, oxygen purity within normal range, Green or Yellow panel indicator should illuminate.	1. P.C. Board. Defective.	1. Replace P.C. Board. **FOR IRC501O2 ONLY** - Unit may need retiming after board replacement. Refer to the timing section in this manual.
***Sens*O_2 ONLY:** **GOOD OXYGEN PURITY, RED PANEL INDICATOR ILLUMINATED** **P.C. BOARD L.E.D. INDICATORS:** **RED:** Off **GREEN:** Off **CONTROL PANEL INDICATORS:** **RED** : On **YELLOW** : Off **GREEN** : Off *Purity Switch setting at 73% or 85%:* After 30 minutes of run time, unit operates normally, oxygen purity within normal range, Green or Yellow panel indicator should illuminate.	1. P.C. Board. Defective.	1. Replace P.C. Board. **FOR IRC501O2 ONLY** - Unit may need retiming after board replacement. Refer to the timing section in this manual.
Sens*O_2 ONLY:** **UNIT NOT OPERATING, ALARM OFF** ***P.C. BOARD L.E.D. INDICATORS: **RED:** Off **GREEN:** Off **CONTROL PANEL INDICATORS:** **RED** : Off **YELLOW** : Off **GREEN** : Off Purity Switch setting at 73% or 85%.	1. P.C. Board. Horn defective (No LED's illuminated on P.C. Board). 2. Purity Switch. Defective. 3. Horn Disconnected.	1. Replace P.C. Board. **FOR IRC501O2 ONLY** - Unit may need retiming after board replacement. Refer to the timing section in this manual. 2. Replace P.C. Board. **FOR IRC501O2 ONLY** - Unit may need retiming after board replacement. Refer to the timing section in this manual. 3. Reattach horn connector to P.C. Board.

TROUBLESHOOTING GUIDE, CONTINUED

NOTE: Refer to the Parts Guide Replacement Procedures following the Troubleshooting Guide for proper replacement or adjustment procedures.

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
***Sens*O2 ONLY:** **P.C. BOARD L.E.D. INDICATORS:** **RED: Off GREEN: Off** **CONTROL PANEL INDICATORS:** **RED : Off YELLOW : Off** **GREEN : Off**	1. Transformer Assembly. a. Molex connector disconnected from P.C. Board. b. Faulty transformer assembly.	1a. Reattach connector. 1b. Replace transformer assembly. [Refer to Procedure 2 - Removing Control Panel (*Sens*O2)].
Green with Yellow Flashing.	1. Internal repairs required.	1. Replace printed circuit board. For IRC501O2 - Unit may need retiming after board replacment. Refer to the timing section in this manual. Call Supplier for service.

TROUBLESHOOTING GUIDE

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
NORMAL OPERATION: **Internal Status Indicators:** **RED: Off GREEN: Off** Unit plugged in, power switch on. 3 "beeps" on start up.	No problems.	System O.K.
POWER LOSS: **Internal Status Indicators:** **RED: Off GREEN: Off** Unit unplugged, power switch on, alarm off.	No problems.	"Battery Free™" Circuit drained. Plug in cord and turn power switch **ON** to recharge.
POWER LOSS: **Internal Status Indicators:** **RED: Off GREEN: Off** Unit plugged in, power switch on, alarm off. "Battery Free™" circuit drained.	1. No Power at outlet.	1. Check electrical outlet with a tablelamp or voltmeter set on 150-200 VAC scale. If outlet isn't working, check protective device in home's electrical panel or consult an electrician. Also ensure that unit is properly plugged in. DO NOT use extension cords. Move to another outlet or circuit.
	2. Power Cord. a. Frayed. b. Broken or damaged spade.	2a.Replace cord. 2b.Replace power cord connectors on plug.
	c. Spade connector from Power Cord loose or disconnected **(inside back of unit).**	2c.Reattach connector.
	3. On/Off switch. a. Disconnected wire.	3a.Check all electrical connections to the On/Off switch for any disconnected wires.
	b. Faulty switch.	3b.If the concentrator does not come on at all and wiring is intact, color code and remove wires one at a time and clean the On/Off switch with contact cleaner while turning the switch on and off. Reinstall switch and turn power on. If switch still doesn't work, replace switch. Transfer wires from old switch to new switch one at a time to the matching contact.

NOTE: REFER TO THE REPAIR/REPLACEMENT GUIDE IN THIS MANUAL FOR PROPER REPLACEMENT OR ADJUSTMENT PROCEDURES

TROUBLESHOOTING GUIDE

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
POWER LOSS, Continued:	4. Circuit breaker. Tripped.	4. Reset breaker. **NOTE: Breaker may trip to safeguard concentrator during a power surge. If breaker trips immediately, there is a probable short in the unit. Check for pinched or charred wires. If the breaker does not trip, run unit for approximately 2 hours. If breaker trips again, there is an internal problem. Contact INVACARE TECHNICAL SERVICE.**
	5. P.C. Board. a. Damaged b. Loose or damaged connector	5a.Replace **(PROCEDURE 11).** 5b.Repair or replace connector.
INTERNAL POWER LOSS **SENSO2:** **Internal Status Indicators:** **RED: Off GREEN: Off** Alarm may or may not be on. **Control Panel Indicators:** **RED: Off YELLOW: Off** **GREEN: Off** Fan operates, power light on, compressor not operating.	1. Transformer Assembly. a. Faulty. b. Connector loose or disconnected. c. Faulty wiring.	1a.Replace **(PROCEDURE 12).** 1b.Reattach connector. 1c.Replace Transformer Assembly **(PROCEDURE 12).**
	2. P.C. Board. Faulty.	2. Replace P.C. Board **(PROCEDURE 11).** For **5LX or 6LX** - Unit may require retiming after P.C. Board replacement **(PROCEDURE 18).**
HIGH PRESSURE: **Internal Status Indicators:** **RED: On GREEN: Off** *(LX Control Board)* **RED: One (1) Flash** **GREEN : Two (2) Flashes** *(Integrated Sensor Board)* *(LX SMT Board)* **Control Panel Indicators:** **RED: On YELLOW: Off** **GREEN: Off** Unit plugged in, power switch on, continuous alarm. Compressor shut down.	1. P.C. Board a. Malfunction	1a.Set flow to max l/min. for concentrator. Check voltage across Pilot Valve 1 on 200 volt scale. If meter reads 0 volts when unit is turned on, replace P.C. Board **(PROCEDURE 11).**
	b. Disconnected Wire.	1b.Check spade connectors on pilot valves 1 and 2 and connectors on P.C. Board.
	c. Shifting Valve at Pressures greater than 25 p.s.i.	1c.Replace P.C. Board **(PROCEDURE 11).** For **5LX or 6LX** - Unit may require retiming after P.C. Board replacement **(PROCEDURE 18).**
	2. 4-way Valve a. Not Shifting.	2a.If voltage rises to approximately 24 volts D.C. when unit shuts down, P.C. Board is functioning properly. Replace 4-way Valve **(PROCEDURE 16).**

NOTE: REFER TO THE REPAIR/REPLACEMENT GUIDE IN THIS MANUAL FOR PROPER REPLACEMENT OR ADJUSTMENT PROCEDURES

TROUBLESHOOTING GUIDE

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
HIGH PRESSURE, Continued	2. b. Bad Coil.	2b. Replace 4-way Valve **(PROCEDURE 16).**
	3. Sieve Beds Contaminated.	3. Replace Sieve Beds **(PROCEDURE 4).**
LOW PRESSURE: **Internal Status Indicators:** **RED: On GREEN: On** *(LX Control Board)* **RED: One (1) Flash** **GREEN : One (1) Flash** *(Integrated Sensor Board)* *(LX SMT Board)* Unit plugged in, power switch on, continuous audible alarm. Compressor shut down (Failure to cycle due to low pressure).	1. Inlet Filter Dirty or Plugged.	1. Replace Inlet Filter **(PROCEDURE 2).**
	2. Compressor. a. Leaks at fittings or tubing.	2a. Replace or repair.
	b. Leaking or defective relief valve.	2b. Repair leak or replace.
	c. Insufficient voltage at outlet.	2c. **DO NOT** use extension cords. Use another outlet.
	d. Worn Cup Seals or Gaskets.	2d. Rebuild Top End of Compressor **(PROCEDURE 2).**
	3. Heat Exchanger a. Leak at tubing or body chamber.	3a. Replace or retighten.
	b. Inspect tubing and heat exchanger.	3b. Replace or retighten tubing. Replace Heat Exchanger **(PROCEDURE 8).**
	4. Regulator cracked or leaking.	4. Replace **(PROCEDURE 6).**
	5. P.E. Valve leaking	5. Replace P.E. valve. Check voltage at P.E. valve connector on 24 volt D.C. scale. The P.E. valve activates or energizes approximately 1 second prior to the activation of the 4-way Valve with approximately 24 volts. If voltage is in excess of 24 volts consistently, replace the P.C. Board. If the P.C. Board voltage acts normally, replace the P.E.valve **(PROCEDURE 3).**
		NOTE: Check for leaks starting at the compressor output through all the pneumatic connections. Major leaks will cause system pressures to remain below adequate shift (exhaust) pressures and will cause compressor shut down.

NOTE: REFER TO THE REPAIR/REPLACEMENT GUIDE IN THIS MANUAL FOR PROPER REPLACEMENT OR ADJUSTMENT PROCEDURES

TROUBLESHOOTING GUIDE

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
LOW CONCENTRATION: **NOTE: Check for O2 purity using a calibrated Oxygen Analyzer at Test Point 1 (OXYGEN OUTLET) of the concentrator.** **Internal Status Indicators:** **RED: On GREEN: Off** (*LX Control Board*) **RED: Two (2) Flash** **GREEN : One (1) Flash** **73% Shutdown** *(Integrated Sensor Board)* **RED: Two (2) Flash** **GREEN : Two (2) Flashes** **85% Shutdown** *(Integrated Sensor Board)* **Control Panel Indicators:** **SensO2 ONLY:** **RED: On** **YELLOW: Off** **GREEN: Off** For SensO2 units, the Red indicator will signal extremely low purity and will be accompanied by a continuous audible alarm and a system shutdown. Repairs are required.	1. Cabinet Filters Dirty.	1. Clean or Replace **(PROCEDURE 2).**
	2. Inlet Filter Dirty.	2. Replace **(PROCEDURE 2).**
	3. Compressor. a. Defective.	3a.Replace Compressor **(PROCEDURE 7).**
	b. Faulty Capacitor.	3b.Replace Capacitor **(PROCEDURE 7).**
	c. Bad Motor Windings.	3c.Replace Compressor **(PROCEDURE 7).**
	d. Worn Seals.	3d.Rebuild Top End of Compressor **(PROCEDURE 2).**
	e. Bad Bearings.	3e.Replace Compressor **(PROCEDURE 7).**
	f. Leak at fittings or tubing.	3f. Replace Fittings or Tubing.
	g. Leaky or Defective Relief Valve.	3g.Replace Relief Valve.
	h. Insufficient voltage **(outlet).**	3h.**DO NOT** use extension cords.
	4. Heat Exchanger. a. Leak at tubing or body chamber.	4a.Replace or Retighten.
	b. Inspect tubing and Heat Exchanger.	4b.Replace or retighten tubing. Replace Heat Exchanger **(PROCEDURE 8).**
	5. Regulator Cracked or Leaking.	5. Replace **(PROCEDURE 6).**
	6. Exhaust Muffler dirty or plugged.	6. Replace **(PROCEDURE 2).**
Internal Status Indicators: **RED: Off GREEN: Off** (*LX Control or Integrated Sensor* Board) **Control Panel Indicators:** **SensO2 ONLY:** **RED: Off** **YELLOW: On** **GREEN: Off** A Yellow indicator signals low purity, but within specification for the user. Repairs are required.	7. Fan a. Not Operating. Unit overheating.	7a.Leads to fan Disconnected. Reconnect **(PROCEDURE 10).**
	b. Faulty Fan.	7b.Replace **(PROCEDURE 10).**
	8. Sieve Beds defective	8. Replace **(PROCEDURE 4).**
	9. Tubing kinked or blocked.	9. Repair or replace.
	10.P.C. Board a. Shifts at wrong pressures.	10a.Check pressure at product tank. Pressure should rise to 20 p.s.i. at shift point. If not, replace P.C. Board **(PROCEDURE 21).**
	b. Pressure transducer tubing leaks.	10b.Inspect tubing at transducer and at product tank. Replace tubing **ONLY** if damage is evident. **(PROCEDURE 9).**

NOTE: REFER TO THE REPAIR/REPLACEMENT GUIDE IN THIS MANUAL FOR PROPER REPLACEMENT OR ADJUSTMENT PROCEDURES

TROUBLESHOOTING GUIDE

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
LOW CONCENTRATION, Continued:	11. Flowmeter. a. Flowmeter opened beyond maximum flow rate. b. Cracked or broken Fitting. c. Input tubing leaking or loose.	11a. Return flow to maximum setting. 11b. Replace fitting. 11c. Repair or replace.
	12. Timing.	12. To accommodate for varying tolerances when replacing components, an adjustable timer is used to control the shifting of the Invacare 5 Pressure Equalization **(P.E.)** Valve **(PROCEDURE 18).**
	13. P.E. Valve. a. Bad Coil. b. Restrictor Blockage.	13a. Replace P.E. Valve **(PROCEDURE 3).** 13b. Replace P.E. Valve **(PROCEDURE 3).**
	14. Inspect P.C. Board Restrictor tubing for kinks or tears.	14. Replace P.C. Board. Unit may need retiming after board replacement **(PROCEDURE 11).**
FLUCTUATING FLOW:	1. Regulator/Flowmeter. a. Incorrectly set regulator. b. Flowmeter malfunction.	1a. Check pressure at oxygen outlet. Adjust Regulator **(PROCEDURE 6).** 1b. If flow is still unstable, check for leaks starting at the compressor outlet fitting through all pneumatic connections. If no leaks are found and flow is still fluctuating, replace the regulator **(PROCEDURE 6).** If pressure at test point is within spec (5 p.s.i. ± 0.2 max. [34.4 kPa ± 6.89]), replace flowmeter **(PROCEDURE 14).**
UNIT EXCESSIVELY LOUD:	1. Pneumatic Exhaust. a. Muffler cracked, damaged or missing. b. Muffler tubing disconnected or damaged.	1a. Replace. **(PROCEDURE 2).** 1b. Reconnect or replace tubing.
	2. Intake Resonator. a. Damaged or missing. b. Tubing disconnected or damaged.	2a. Install new resonator. 2b. Reconnect tubing or replace.
	3. Inlet Filter missing.	3. Replace inlet filter.
	4. Compressor.	4. Replace Compressor. Internal damage **(PROCEDURE 7).**

NOTE: REFER TO THE REPAIR/REPLACEMENT GUIDE IN THIS MANUAL FOR PROPER REPLACEMENT OR ADJUSTMENT PROCEDURES

TROUBLESHOOTING GUIDE

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
UNIT OVERHEATS:	1. Base Exhaust Vent Plugged or restricted.	1. Place unit at least 3-inches from any wall. DO NOT place unit on pile or shag carpeting that may restrict air flow.
	2. Cabinet Filters Dirty or blocked.	2. Clean or replace **(PROCEDURE 2).**
	3. Fan. a. Leads to fan disconnected. b. Defective Fan. c. Fan installed upside down.	3a.Reconnect leads. 3b.Replace fan **(PROCEDURE 10).** 3c.Install fan with air flow arrow pointing down **(PROCEDURE 10).**
	4. Heat Exchanger. a. Fins dirty or plugged. b. Fins damaged.	4a.Clean heat exchanger **(PROCEDURE 2).** 4b.Replace heat exchanger **(PROCEDURE 8).**
	5. Compressor. a. Defective. b. Faulty capacitor. c. Bad motor windings. d. Worn seals. e. Bad bearings.	5a.Replace compressor **(PROCEDURE 7).** 5b.Replace capacitor **(PROCEDURE 7).** 5c.Replace compressor **(PROCEDURE 7).** 5d.Replace compressor **(PROCEDURE 7).** 5e.Replace compressor **(PROCEDURE 7).**
	6. Line Voltage excessive **(surge).**	6. Have line voltage inspected by certified electrician. A voltage regulator may be required and is obtainable from your local electric company.
OXYGEN PURITY: GOOD **Internal Status Indicators:** **RED: Off GREEN: Off** **Control Panel Indicators:** **RED: Off YELLOW: Off** **GREEN: Off** Purity Switch setting at 73% or 85%: After 30 minutes of run time, unit operates normally, oxygen purity within normal range. Green or Yellow panel indicator should illuminate.	1. P.C. Board defective.	1. Replace P.C. Board **(PROCEDURE 11).** Unit may need retiming after P.B. Board replacement **(PROCEDURE 18).**

NOTE: REFER TO THE REPAIR/REPLACEMENT GUIDE IN THIS MANUAL FOR PROPER REPLACEMENT OR ADJUSTMENT PROCEDURES

TROUBLESHOOTING GUIDE

SYMPTOM:	PROBABLE CAUSE:	SOLUTION:
UNIT NOT OPERATING **ALARM: OFF** **Internal Status Indicators:** **RED: Off** **GREEN: Off** **CONTROL PANEL INDICATORS:** **RED: Off** **YELLOW: Off** **GREEN: Off** Purity Switch setting at 73% or 85%.	1. Purity Switch. Defective. 2. Horn. Disconnected.	1. Replace P.C. Board. **(PROCEDURE 11).** Unit may need retiming after board replacement. **(PROCEDURE 18).** 2. Reattach horn connector to harness.
UNIT NOT OPERATING, **Internal Status Indicators:** **RED: Off** **GREEN: Off** **Control Panel Indicators:** **RED: Off** **YELLOW: Off** **GREEN: Off** Power Switch ON. Continuous audible alarm.	1. Transformer Assembly. a. Molex connector disconnected from P.C. Board. b. Faulty transformer assembly.	1a. Reattach connector. 1b. Replace transformer assembly **(PROCEDURE 12).**
UNIT NOT OPERATING, **Internal Status Indicators:** **RED: Three (3) Flashes** **GREEN: One (1) Flash** (Integrated Circuit Board) **Control Panel Indicators:** **RED: Off** **YELLOW: Flashing** **GREEN: On**	1. Internal repairs required.	1. Replace SensO2 circuit board **(PROCEDURE 11).**

NOTE: REFER TO THE REPAIR/REPLACEMENT GUIDE IN THIS MANUAL FOR PROPER REPLACEMENT OR ADJUSTMENT PROCEDURES

PROCEDURE 3 - REPLACING P.E. VALVE - 5LX/5LXO2/5LXO2T/6LXO2/6LXO2T ONLY (FIGURE 1)

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**
3. Remove spade connectors from P.E. Valve assembly.
4. Remove ty-wraps from P.E. Valve tubing.
5. Remove P.E. valve assembly from tubing.

CAUTION
If P.E. Valve is not to be installed immediately, plug the P.E. Valve tubing to prevent sieve bed contamination.

6. Install new P.E. valve assembly immediately, by reversing **STEPS 3-5.**

NOTE: After replacing P.E. valve, retiming may be necessary. Refer to PROCEDURE 18 - TIMING OF THE INVACARE 5 CONCENTRATOR.

7. Run unit and check for leaks **(Refer to PROCEDURE 19 - LEAK TEST).**
8. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

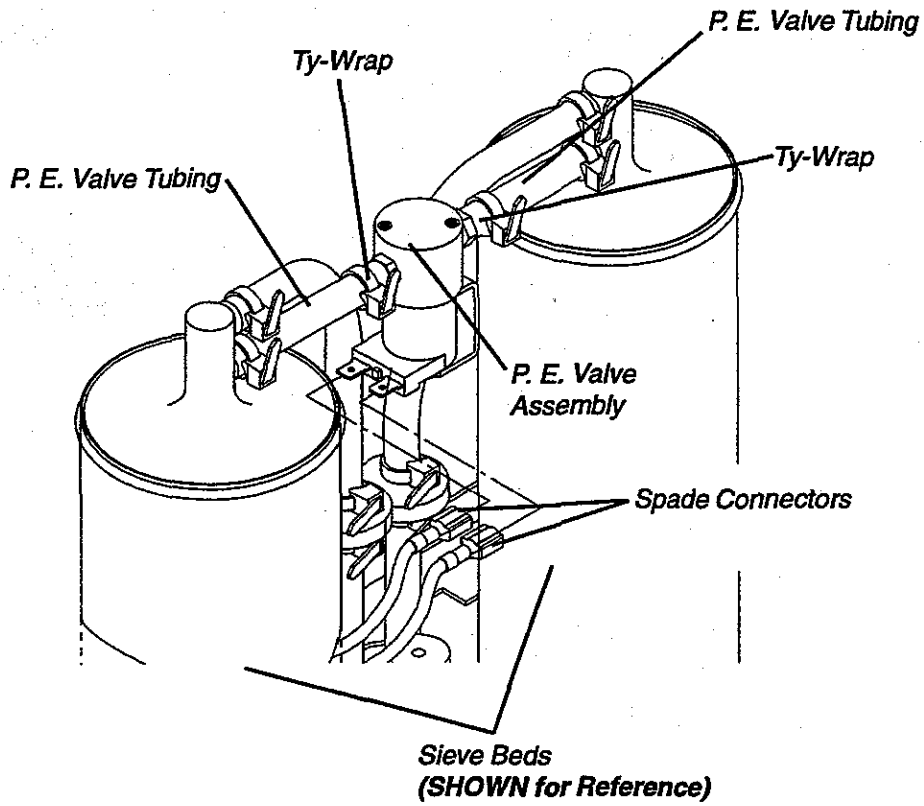


FIGURE 1 - REPLACING P.E. VALVE (5LX/5LXO2/5LXO2T/6LXO2/6LXO2T ONLY)

PROCEDURE 4 - REPLACING SIEVE BEDS (FIGURE 1)

CAUTION

TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

NOTE: Always replace Sieve Beds in pairs to ensure that both beds are in optimum condition.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**
3. Remove ty-wraps and disconnect P.E Valve and sieve bed tubing from top of sieve beds.
4. Remove P.E. Valve assembly **(Refer to PROCEDURE 3 - REPLACING P.E. VALVE (5LX/5LXO2/ 5LXO2T/6LXO2/6LXO2T ONLY).**
5. Loosen adjustable clamps on sieve beds and slide clamps down below the adjustable clamp hangers.
6. Lift sieve beds up and rest sieve beds on top rear of base.
7. Remove plastic clamps and reinforced tubing from bottom of both sieve beds and remove sieve beds.

CAUTION

DO NOT remove plastic caps from NEW sieve bed fittings until ready to install NEW beds. Severe sieve contamination can occur if uncapped beds are exposed to air.

8. Remove plastic caps from the top and bottom fittings of the **NEW** sieve beds.
9. Install **NEW** sieve beds reversing **STEPS 3-7.**

NOTE: After replacing sieve beds, retiming may be necessary. (Refer to PROCEDURE 18 - TIMING OF THE INVACARE 5 CONCENTRATOR).

10. Run unit and check for leaks **(Refer to PROCEDURE 19 - LEAK TEST).**
11. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

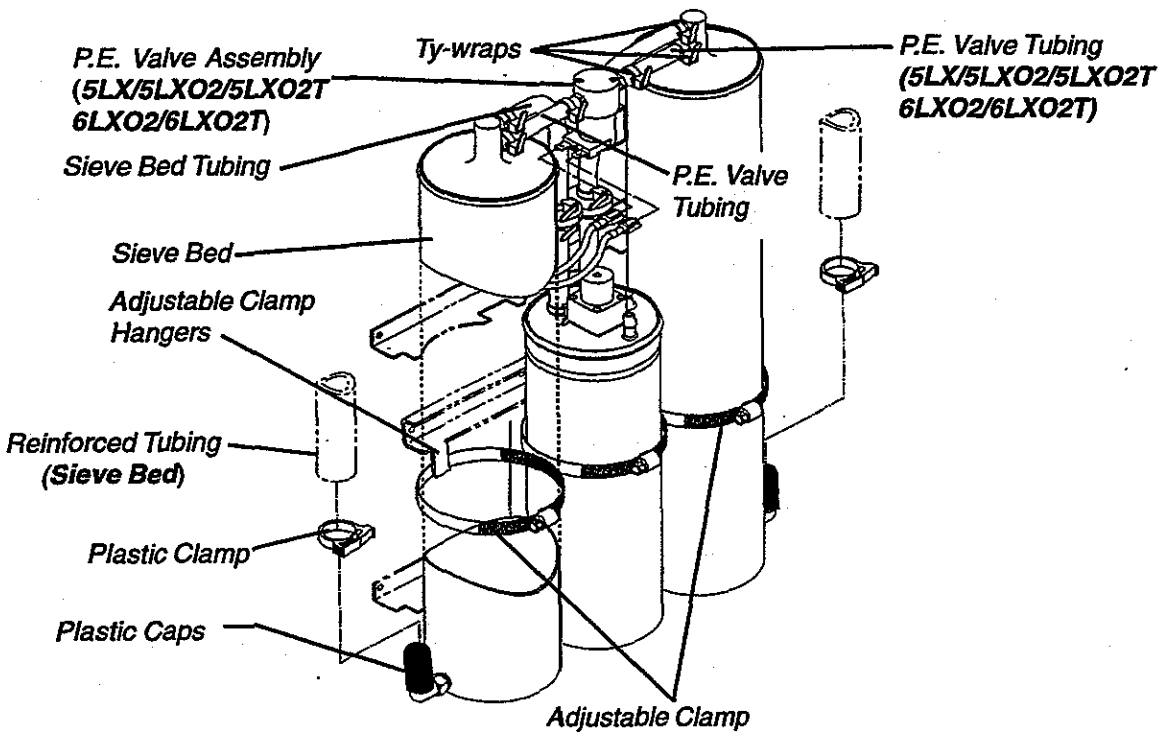


FIGURE 1 - REPLACING SIEVE BEDS

PROCEDURE 5 - REPLACING CHECK VALVES (FIGURE 1)

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET)**

NOTE: Replace one or both check valves when performing this procedure. The check valves are one-way directional and can be checked by passing air through them. Air should flow in one direction ONLY.

3. Loosen adjustable clamp on product tank and slide clamp down below the adjustable clamp hanger to access check valve(s).
4. Remove ty-wraps from top and bottom of the check valve(s) and disconnect check valve(s) from tygon tubing.

CAUTION
The check valves are one-way directional and MUST be installed correctly. The letters VAC are printed on the bottom half of the check valves and should be installed with VAC to the underside of the check valve. Low system pressures and eventual bed contamination will result if not properly installed.

5. Install the **NEW** check valve(s) into the tygon tubing.

NOTE: Ensure proper orientation of check valves when installing.

6. Secure the check valve(s) by installing new ty-wraps to the tygon tubing where previously removed.

NOTE: If tygon tubing is damaged in any way, replace the section of tygon tubing before installing check valve(s).

7. Run unit and check for leaks **(Refer to PROCEDURE 19 - LEAK TEST).**
8. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

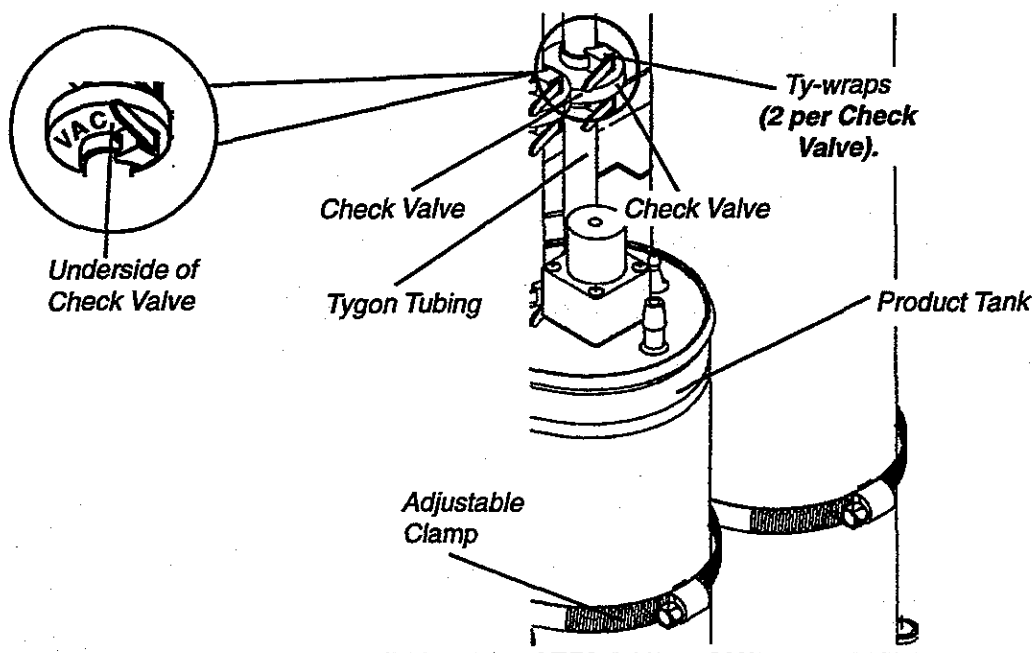


FIGURE 1 - REPLACING CHECK VALVES

PROCEDURE 6 - REPLACING / ADJUSTING REGULATOR

Replacing Regulator (FIGURE 1)

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**
3. Loosen adjustable clamp on product tank and slide clamp down below the adjustable clamp hanger.
4. Pull product tank back and up to access regulator.
5. Remove the four (4) mounting screws that secure regulator to product tank cap.
6. Remove regulator from product tank cap ensuring that the "O" rings are removed.

NOTE: Clean mounting surface of product tank lid. Ensure that the two (2) "O" rings for the NEW regulator are installed onto the ports (underside) of the NEW regulator before installation.

CAUTION
Ensure proper installation of regulator. Note flow arrow on regulator. This MUST face toward the front of unit or flow will be interupted causing system shutdown.

7. Install new regulator onto product tank by reversing **STEP 5.**
8. Torque mounting screws to 5 ± 1 inch lbs.
9. Re-install product tank and secure with the adjustable clamp.
10. Adjust regulator pressure if necessary **(Refer to ADJUSTING REGULATOR (FIGURE 2) in this PROCEDURE).**
11. Run unit and check for leaks **(Refer to PROCEDURE 19 - LEAK TEST).**
12. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

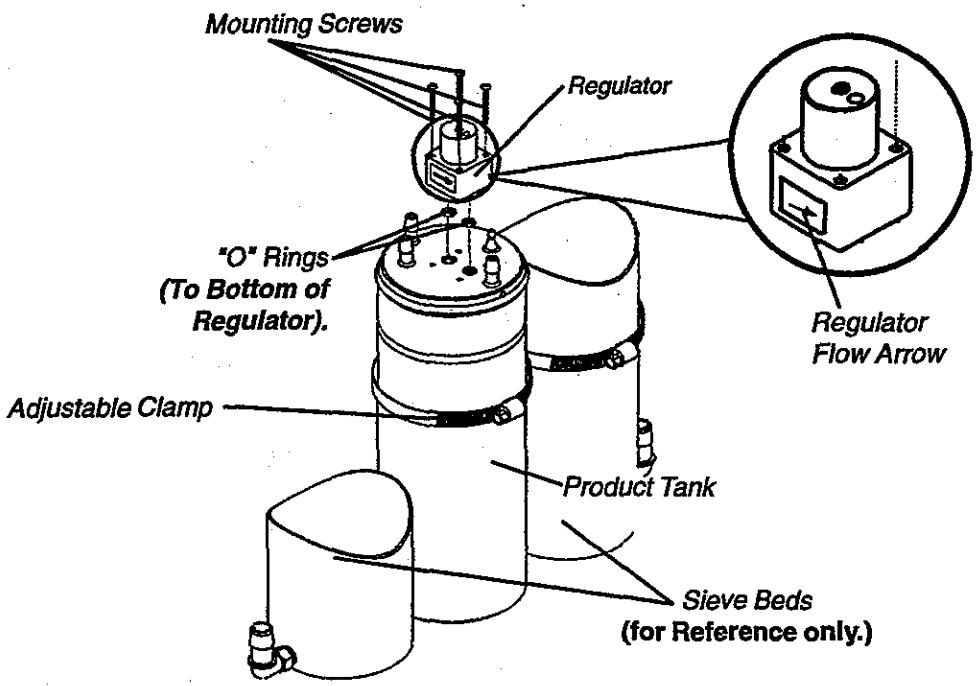


FIGURE 1 - REPLACING REGULATOR

PROCEDURE 6 - REPLACING / ADJUSTING REGULATOR

Adjusting Regulator (FIGURE 2)

1. Turn unit **ON.**
2. Install pressure gauge onto oxygen outlet.

NOTE: Check O2 pressure at oxygen outlet. It should read a steady 5 p.s.i. ± 0.5 p.s.i. If pressure is not in specification, proceed to STEP 3. If difficulty is encountered in adjusting or maintaining 5 p.s.i. ± 0.5 p.s.i., refer to the TROUBLESHOOTING GUIDE in this manual for assistance. If pressure does fall within specification, operate normally.

CAUTION

TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

3. Unplug unit.
4. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**
5. Move product tank back to access regulator **(Refer to PROCEDURE 6 - REPLACING/ADJUSTING REGULATOR - Replacing Regulator [FIGURE 1]).**
6. Plug unit in and turn power switch **ON.**
7. Locate the pressure adjustment screw in center of regulator.
8. Insert a 3/32-inch Allen wrench into the pressure adjustment screw.
9. While reading pressure gauge, turn pressure adjustment screw:
   a) Clockwise to **increase** output pressure or;
   b) Counterclockwise to **decrease** output pressure.
10. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

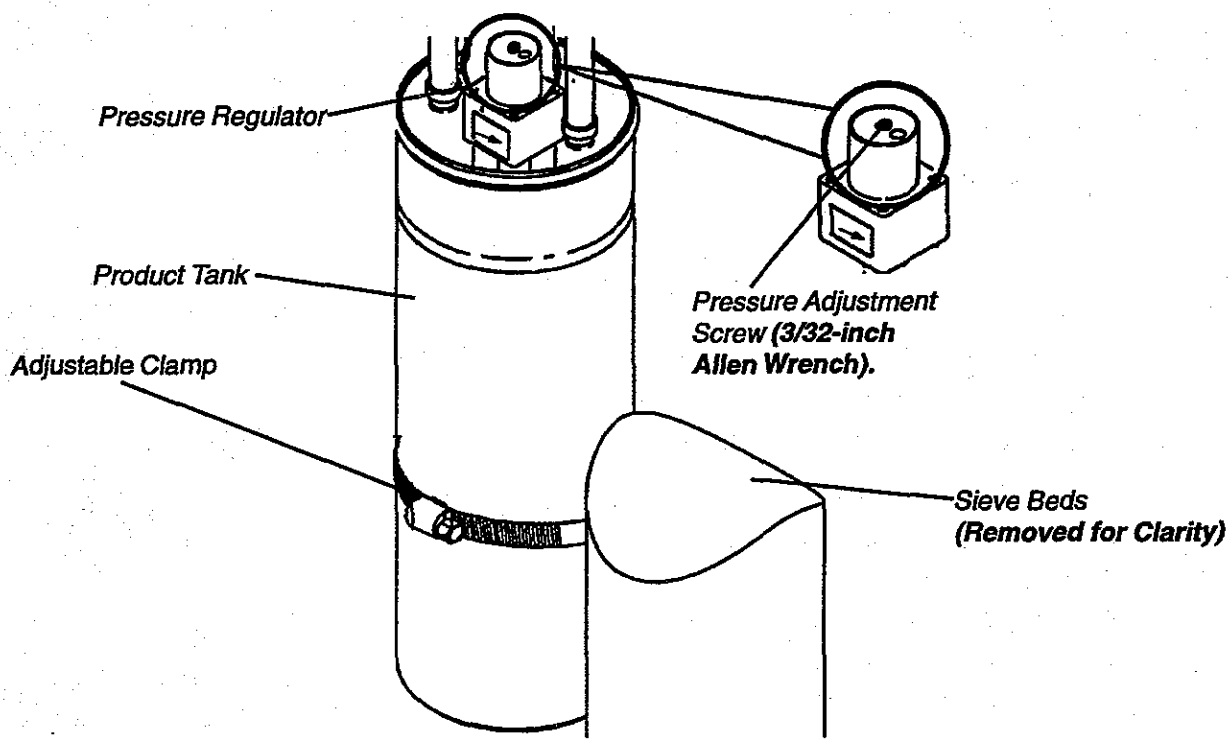


FIGURE 2 - ADJUSTING REGULATOR

PROCEDURE 7 - REPLACING COMPRESSOR ASSEMBLY OR CAPACITOR

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

Replacing Compressor Assembly (FIGURE 1)

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**
3. Disconnect intake and exhaust hoses from compressor assembly.

NOTE: Leave intake resonator intact on compressor assembly until compressor has been removed from concentrator.

4. Disconnect molex connector from compressor assembly.
5. Disconnect ground **(green)** wire **(NOT SHOWN)** from back of sound box and pull wire through grommet.
6. Cut and remove ty-wraps.
7. Remove the four (4) mounting screws securing compressor brackets to base.
8. Tilt compressor assembly toward front of unit and lift out.

NOTE: If replacing capacitor only, proceed to Replacing Capacitor (FIGURE 2).

9. Remove intake resonator from existing compressor and install onto NEW compressor.
10. Reverse **STEPS 3-8** to install new compressor assembly.
11. Run unit and inspect for leaks **(Refer to PROCEDURE 19 - LEAK TEST).**
12. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

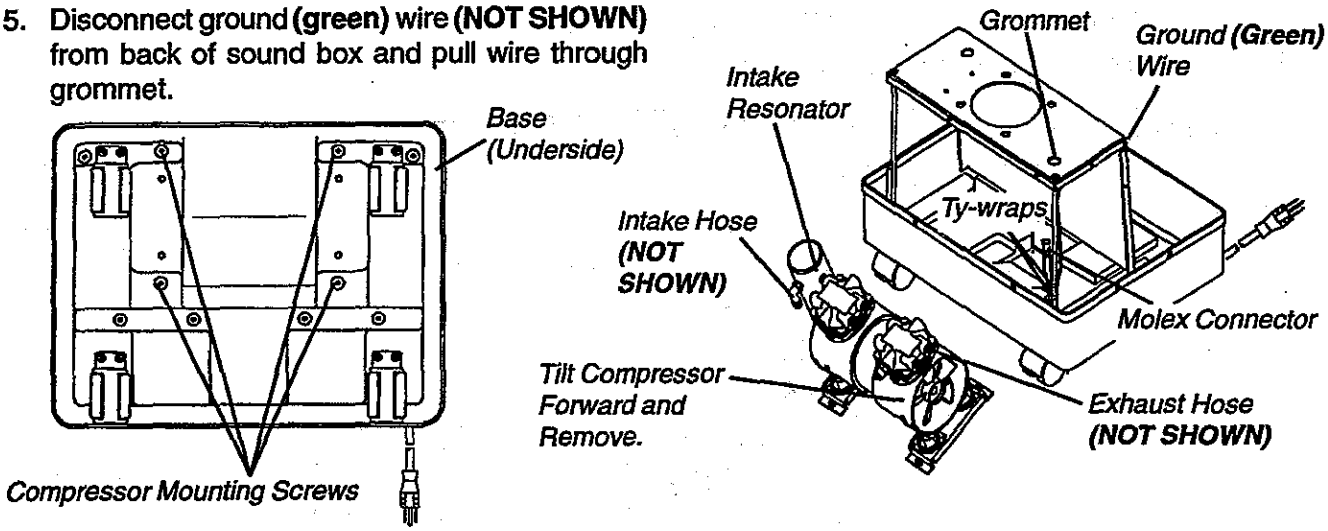


FIGURE 1 - REPLACING COMPRESSOR ASSEMBLY

Replacing Capacitor (FIGURE 2)

1. Remove compressor. **(Refer to Replacing Compressor Assembly (FIGURE 1).**
2. Remove terminal boot on wires (if present).
3. Disconnect the wires to the capacitor.
4. Remove ty-wraps and capacitor from bottom of Compressor Mounting Bracket.
5. Install **NEW** capacitor by reversing **STEPS 2-4.**
6. If applicable, transfer the unterminated terminals from the OLD capacitor to the NEW capacitor.
7. Reconnect spade connectors from compressor to connectors on capacitor.
8. Reinstall compressor assembly. **(Refer to Replacing Compressor Assembly) (FIGURE 1).**

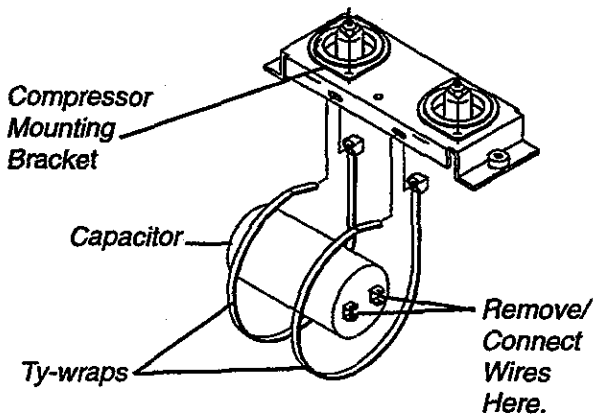


FIGURE 2 - REPLACING CAPACITOR

PROCEDURE 8 - REPLACING HEAT EXCHANGER (FIGURE 1)

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**
3. Remove compressor assembly **(Refer to PROCEDURE 7 - REPLACING COMPRESSOR ASSEMBLY OR CAPACITOR).**

NOTE: Concentrator can be laid down to more easily access heat exchanger.

4. Cut the four (4) ty-wraps that secure the heat exchanger to the four (4) ty-wrap mounts under the top of the sound box.

CAUTION
If applicable, use care not to damage fins of heat exchanger when installing, removing or cleaning.

5. Loosen the adjustable clamps on the compressor output and valve manifold input hoses at the front and rear of the heat exchanger.
6. Move the heat exchanger out to access the hoses and remove them from the heat exchanger.
7. Remove heat exchanger.
8. Ensure that protective **(paper)** cover is installed onto the front of finned heat exchanger. If NEW heat exchanger is being installed, discard protective paper cover.
9. Reverse **STEPS 4-6** to install new heat exchanger.
10. Torque adjustable clamps to heat exchanger to 6.5 ± 1 inch lbs.
11. Run unit and check for leaks **(Refer to PROCEDURE 19 - LEAK TEST).**
12. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

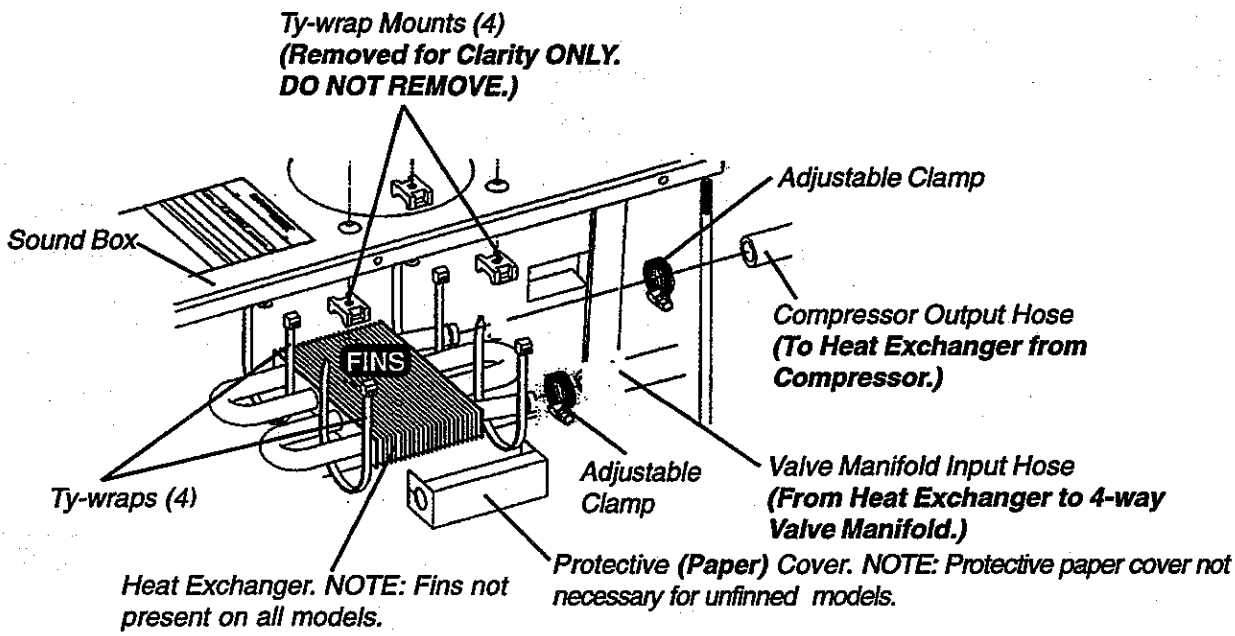


FIGURE 1 - REPLACING HEAT EXCHANGER

PROCEDURE 9 - REMOVING CONTROL PANEL (FIGURE 1)

CAUTION
TO PREVENT ELECTRICAL SHOCK, ALWAYS DISCONNECT CONCENTRATOR FROM ELECTRICAL OUTLET BEFORE SERVICING.

1. Unplug unit.
2. Remove cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**
3. Remove the two (2) upper mounting screws that secure the control panel.
4. Loosen the two (2) lower mounting screws that secure the control panel.
5. Cut the ty-wraps that secures the 1/8-inch I.D. transducer tubing to the product tank and remove tubing from the top of the product tank.
6. Remove the 1/4-inch I.D. pressure regulator tubing from the tee fitting behind the control panel.
7. Disconnect the 9-pin molex connector from P.C. Board.
8. Disconnect the 8-pin molex connector from P.C. Board.
9. Disconnect the 4-pin connector to interface cable from P.C. Board (Telemetry Unit ONLY).
10. Remove and code connectors from circuit breaker, hour meter and On/Off switch. **(Jumper wire harness from On/Off switch to circuit breaker does not have to be removed).**
11. Remove control panel.
12. Reverse **STEPS 3-10** to re-install control panel.
13. Run unit and check for leaks at transducer tubing on product tank cap **(Refer to PROCEDURE 19 - LEAK TEST).**
14. Reinstall cabinet **(Refer to PROCEDURE 1 - REMOVING CABINET).**

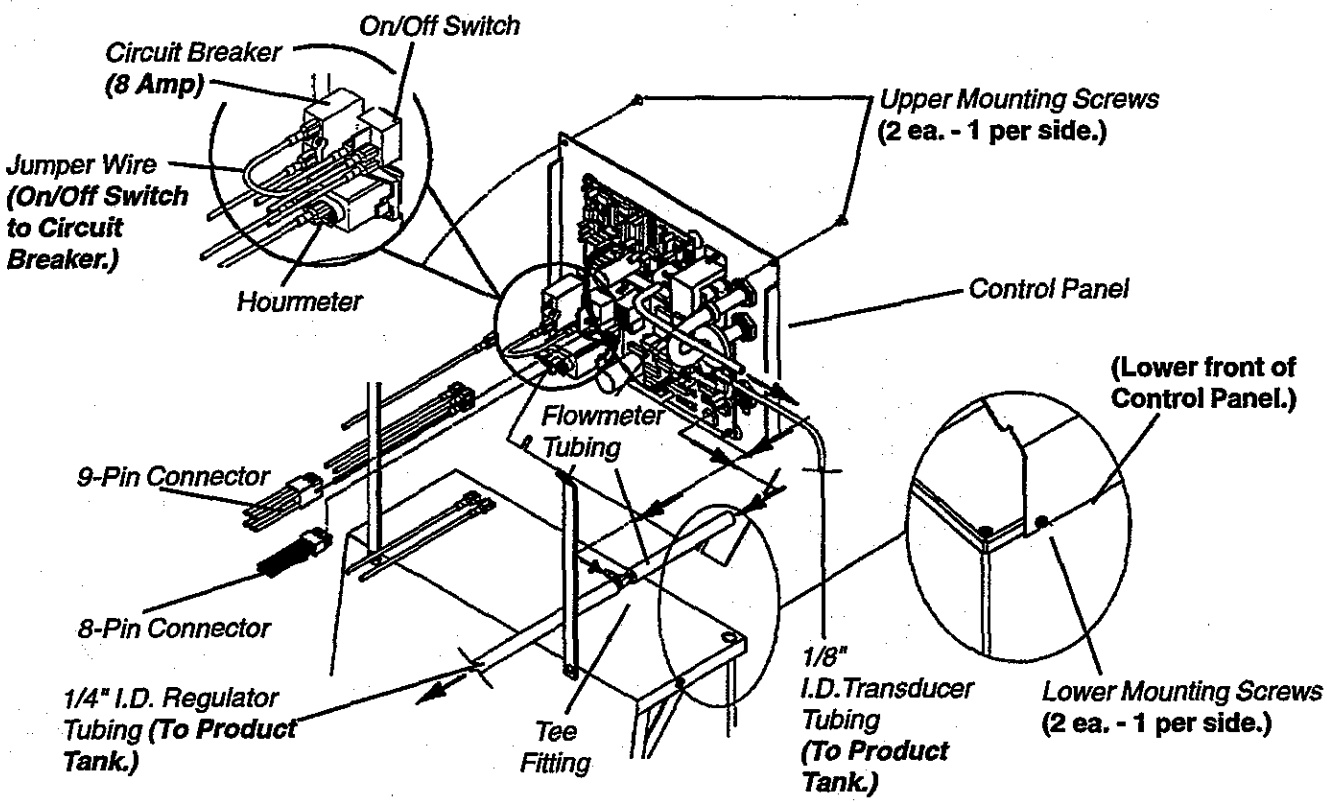

On/Off Switch
Circuit Breaker (8 Amp)
Upper Mounting Screws (2 ea. - 1 per side.)
Jumper Wire (On/Off Switch to Circuit Breaker.)
Hourmeter
Control Panel
(Lower front of Control Panel.)
Flowmeter Tubing
9-Pin Connector
8-Pin Connector
1/4" I.D. Regulator Tubing (To Product Tank.)
Tee Fitting
1/8" I.D.Transducer Tubing (To Product Tank.)
Lower Mounting Screws (2 ea. - 1 per side.)

FIGURE 1 - REMOVING CONTROL PANEL